FEBRUARY, 1957

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FOOD ENGINEERING

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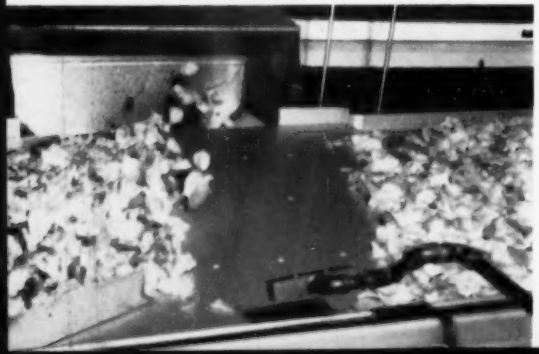

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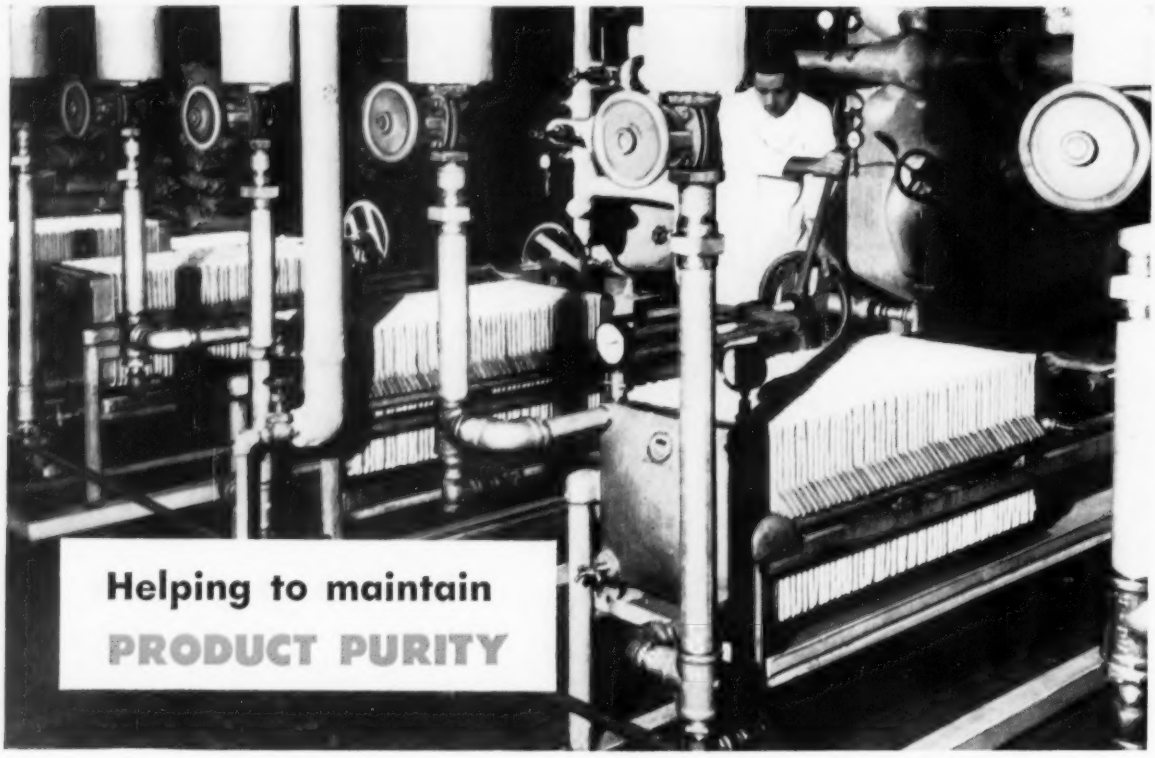
MAINTENANCE • INGREDIENTS • PERSONNEL
PRODUCTS • PACKAGING



Pre-filtered water at Hoffman Beverage Company being pumped through bank of filters. Grinnell-Saunders Diaphragm Valves shown are stainless steel.

GRINNELL-SAUNDERS DIAPHRAGM VALVES

For help in preserving product purity, Hoffman Beverage Company (above) turned to Grinnell-Saunders Diaphragm Valves. Working parts of the valve are completely isolated at all times from the fluid in the stream. There's no disc holder in the stream; no chance of valve lubricant contaminating the product. Furthermore, the diaphragm lifts high for unobstructed flow in either direction with no pockets to trap fluid. Resilient diaphragm and large area of contact on the valve weir assures leak-proof closure.

Of course, simple maintenance is important, too. The only part of the valve that normally needs replacing is the long-wearing diaphragm, which can be inserted quickly, without removing the valve from the line.

Grinnell offers its diaphragm valve in a wide range of body and bonnet styles and also body, lining, and diaphragm materials. For the beer industry, for example, Grinnell has an *all-bronze* valve with fully-rounded opening, which permits ball-brush cleaning through the valve.

If you have a valve problem, it will certainly be worth your while to consult a Grinnell engineer.

Choice of materials

Bodies
Iron; cast steel; stainless steel; Durimet 20; Hastelloy A, B, C; bronze; Monel; aluminum; PVC (polyvinyl chloride); Saran

Body Linings
Hard rubber; soft rubber; neoprene; glass; lead; plastics; Heresite; Lithcote

Diaphragms
Soft natural rubber; natural rubber; white synthetic rubber; neoprene; reinforced neoprene; butyl; Hycar; Teflon; Kel-F; PVC (polyvinyl chloride); polyethylene

Bonnets
Iron; stainless steel; bronze; other materials on special order

Valve types

Straight Bodies
Screwed; flanged; socket weld; butt weld; socket (solder); sanitary threads; hose ends; Victaulic

Angle Bodies
Screwed; flanged; socket weld

Bonnets
Handwheel (non-indicating stem, indicating stem); chain wheel; lever (for quick operation); sliding stem (for a wide selection of power operated topworks).

GRINNELL
WHENEVER PIPING IS INVOLVED

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

← For more data, circle this page number on card at back

the new FOOD ENGINEERING

FEBRUARY 1957

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Vacuum packaging cuts SO_2 treatment sharply, yet gives French-fries 10-16-day shelf-life.

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Nitriting Curbs Rust on Cans 99
Inhibiting methods readily applied, and agent employed is neither toxic nor expensive.

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Puts spotlight on preventive maintenance pointers that curtail costly truck down-time.

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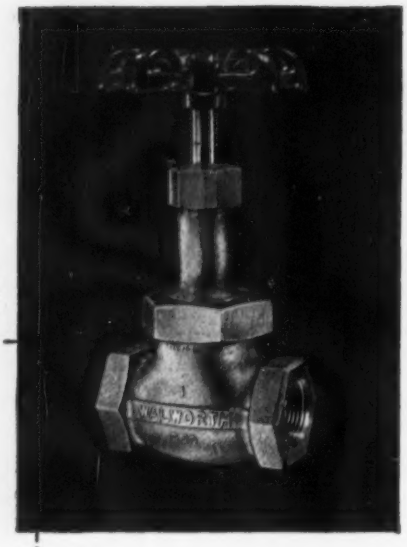
IDENTIFICATION DISC: An aluminum marking plate on all Walworth No. 225P's facilitates inventory control and makes reordering quick and positive.



take a good look at the Walworth "500 Brinell" no. 225P Globe

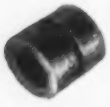
NEWLY DESIGNED HANDWHEEL: Patented air-cooled, finger-fit handwheel affords sure grip even with greasy gloves.

– the Toughest Bronze Valve Your Money Can Buy

The stainless steel, corrosion resistant seats and discs are heat treated to a hardness of 500 Brinell – hard enough to scratch glass and crush nails! The valve can be closed on sand, slag, and pipe scale without injury to the seating surfaces. "Wire drawing" is practically eliminated. All parts are accurately machined and gaged. Years of tight, positive shut-off are assured.

Available in both globe and angle types (angle type: No. 227P) in sizes ¼" to 2", this quality valve is recommended for 350 lbs. W.S.P. at 550 F, and 1000 lbs. non-shock service on cold water, oil, gas, or air.

For full data on this long-life, economical Walworth Bronze Valve, see your local Walworth distributor, or write for Circular.



IMPROVED PACKING: Molded packing of lubricated asbestos reinforced with copper wire. Suitable for practically every service. Valves can be repacked under pressure when fully opened.

note these 7 Great Features

HEXAGONAL UNION BONNET CONNECTION: Union bonnet connection eliminates any chance of distortion or leakage even though valve is repeatedly taken apart and reassembled.

OVERSIZE STEM: The high-tensile strength silicon-bronze stem assures long life and protection against wear.

SEATS AND DISCS: Plug type seats and discs of stainless steel, heat-treated to 500 Brinell hardness and machined simultaneously to a mirror-like finish, with accurate tapers assures tight positive shut-off with minimum handwheel effort.

EXTRA STRONG BODY: Made of Composition M (ASTM B61) bronze. Thick walls and rugged hexes provide a high safety factor. Valves undergo hydrostatic shell test of 1,200 psi.

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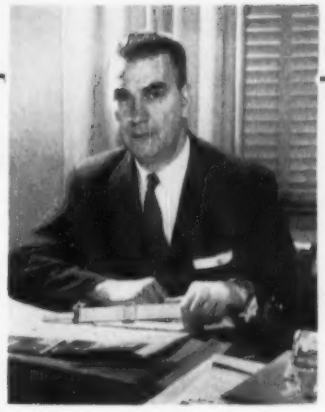

Hello . . .

I'm Art Gemmill

You caught me checking performance calculations for an article on an advanced process. You'll be reading it soon in FE. As a Senior Associate Editor, I constantly evaluate new methods and equipment for you and other readers.

Fascinating work—because new things are coming fast. The rate of engineering advance has accelerated steadily since World War II. And from what I see in my travels, this year will top them all.

Frankly, it will take a lot of progress in plant operations to protect sales volume and profit margins. You face higher costs, plus tougher competition for the consumer-preference vote on quality.

You will see, for instance, new deodorizing units going into a lot of food plants. No less than seven of these have been introduced, and they are attracting wide attention because they improve flavor.

This bit of progress takes me back to a problem I had as production manager of a southern ice cream plant, in the mid-20's. Dairy products received in the spring and early summer literally reeked of garlic and grass.

What to do? First I experimented with processing changes. None did the trick. Then I tried aeration. I set up a small compressor to bubble air through the hot mix during the 30-min. pasteurizing period. Homemade, yes. But it did remove objectionable flavors.

This solution came out of previous experience as a chemical engineer. And problems like that took me into food engineering, which I have combined with editing during 11 years on the staff of FE.

Enough about that. You want to get into the meat of this FE. And thanks for stopping by to get acquainted.

Do Norda Flavors get unique tests from Norda men?

These Norda flavor specialists are matching a flavor such as you might want Norda to match.

Notice the senses they're using.

One expert is, naturally, tasting. The other is *smelling* the flavor.

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TRENDS & FORECASTS

Special

FOOD ENGINEERING

Service to Executives

Best year in history. That's what 14 economists predicted at a National Industrial Conference Board Economic Forum for business in 1957. Output is expected to rise in the first half of the year, then taper off or plateau. A national product gain of 4% is seen, about half of it due to higher prices. FE also foresees the best year in history for food.

Significant to food manufacturers is the fast rise in the proportion of medium- and high-income families. These spend twice as much, and more, for food as those with low incomes. And they go for quality and convenience items.

Forty-one percent of 50 million families have incomes of $5,000 or more—double the number in 1950—and this percentage will continue to increase. About one out of twelve families earns better than $10,000, again double the number 6 years ago. This trend presents an unparalleled opportunity to the food industry.

Aimed at the $17 billion institutional food business is an accelerating trend among food packers to portion-control items. Many of these are partially prepared to cut costs in mass-feeding kitchens. Restaurant managers are keenly interested.

Food company merger trend almost certainly will be accelerated this year. Larger firms will seek further product diversification to broaden their bases. And many small companies will find it difficult to finance adequate research, development, modernization, and promotion.

Big spenders for progress in 1957 will be the canning branch, up 22% in capital outlay; dairy, up 20%; flour milling, up 16%; brewing, up 12%. Indicated increase for baking is 1%.

Consumption of prepared cake mixes increased more than ten-fold in the past nine years—from 50 million packages in 1947 to 568 million in mid-1956. And this is reported to have stimulated the sale of bakers' cakes.

Two Views on Tight Money

Tight money could have an ominous meaning to food companies operating on borrowed capital. But there are two viewpoints.

An encouraging outlook was presented to FE by California's Bank of America. Executive vice-president Lloyd Mazzera put it this way: "Even though the tight money situation should continue, it will in no way effect, or hamper our desire, willingness, or ability, to take care of the legitimate credit requirements of our customers."

This points to "business as usual" for 1957.

But some well-known Eastern food company presidents have expressed a fear that it would be more difficult, at least for small firms, to obtain money. As one expressed it, most banks, like other businesses, will take care of their more important customers first.

Sugar Prices Spiral Upward

It looks as if higher sugar prices may boost the cost of ingredients for many food manufacturers this year.

Much depends upon the effect of steps being taken by the government to halt—and if possible reverse—the inflationary spiral in world and U.S. sugar prices.

Washington's action, spelled out in a four-point program by Secre-

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Bonds readily with cement, hot or cold asphalt
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United Cork Companies have 50 years of experience and leadership in serving the requirements of the refrigeration industry. Use the coupon below for additional product information and installation data, your United representative will be glad to advise you.

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tary of Agriculture Benson, came in mid-January as prices soared to their highest point since Korea, with undiminished strength.

The world price of $5.70 per cwt. had climbed 25¢ above the price for domestic sugar—after allowing for a $1 per lb. differential for U.S. import duty, ocean freight, and insurance on imported supplies.

The $5.70 per cwt. f.a.s. Cuban price prevailing on Jan. 11 reflected a rise of $2.40 in world prices in little more than two months. In the same period, prices for U.S. spot, duty paid, c.i.f. New York, had moved up from $6.27 per cwt. The latter figure is equal to $5.45 when rolled back to Cuba.

To cope with the situation, USDA took these steps:

1. Immediately increased total domestic sugar marketing quotas to 9 million tons for 1957, from 8.8 million tons set previously.

2. Increased the total acreage that domestic beet sugar producers may plant this year to 950,000 acres, a hike of 18,000 acres from the total set only two weeks previously (Jan. 3) and of 100,000 from the amount permitted in 1956.

3. Urged the International Cooperation Administration and other agencies to review foreign aid and U.S. government credit programs to avoid any "direct or indirect effect of supporting the inflationary trend in world sugar prices."

4. Began to study the need of imposing USDA controls to prevent the export of domestically produced sugar so long as world prices remain above parity.

Whether these measures will succeed is a big question. The increase in prices has been fed by several factors, some of which still persisted in January. Among the causes were the reduction of world sugar stocks, after several years of heavy surpluses; a disappointing 1956 European sugar crop; and the "anxiety" caused by the Suez crisis.

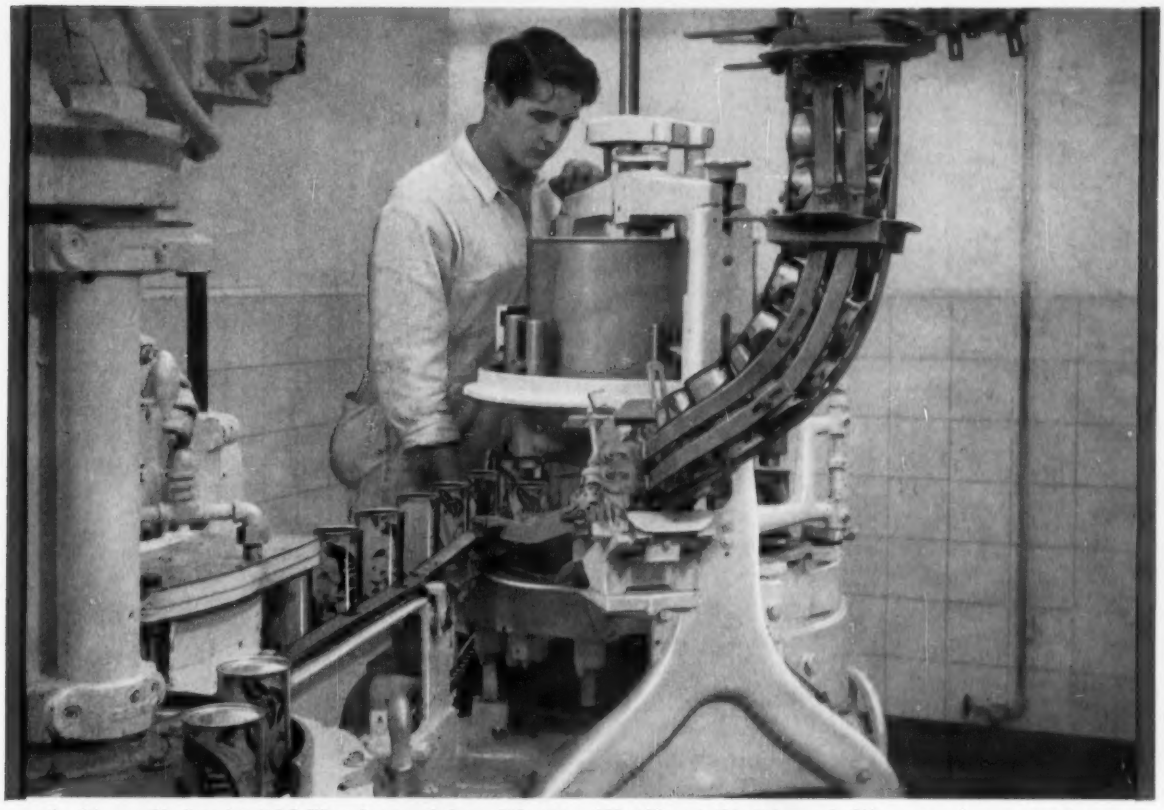
Big Gain in Frozen Meat

Some 3.3 billion pounds of packaged meat will be frozen annually within the next 5 years, according to a USDA study. This will be equivalent to 75% of the commercial pack of all frozen foods in 1955, and to 20% of total packaged fresh meat marketed in that year.

Some industry experts are even more optimistic. Swift's Henry Schumacher believes that 30 to 35% of all meat sales will be in frozen products within 3 years and 50% in 5 years.

At the beginning of 1956, an esti-

"Our FMC M&S Filler has performed excellently in all respects" ---------- Says C. W. REYNOLDS, Manager
Products Division,
Ventura Coastal Lemon Company



"...We use this 6 pocket M&S Filler almost entirely on 211 x 414 cans, operating at a speed of 216 cpm on citrus juice concentrates. On occasion we have also used it for filling 202 x 214, 202 x 314, 307 x 409, and 404 x 414 cans. In 3½ years we have averaged over a quarter of a million cans a day, two 20-hour days a week, 6 to 8 months a year. Repairs have been minor."

These fillers give you a higher case yield per batch of product

FMC—M&S Plunger or Piston Fillers are built in 6, 9, 10, 15, 20 and 30 pocket sizes. They are designed on the time-proven principle of product pre-measurement and positive ejection into containers by precision pistons. Ideally adaptable to a wide range of liquid, semi-liquid and heavy semi-solid products.

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FMC offers fillers of highest speed and accuracy for every food filling job—from liquids to semi-solids. By actual comparison testing, M & S positive displacement type fillers give you the four things that you want most in a filler—

1. *High Accuracy.* Exclusive pre-measuring principle of M&S insures consistant filling accuracy for higher case yield per batch of product.

2. *Low Maintenance.* Rugged construction and precision engineering of M&S assures long life and dependability under the heaviest production requirements.

3. *High Speed Operation.* The M&S line includes fillers in every speed range—equalling the speed of latest cappers and closing machines—without sacrifice of accuracy.

4. *Sanitary by Design.* Available in stainless and non-corrosive type contact materials to meet specific needs. Easily dismantled for cleaning.

This is why M&S has been recognized as the "Standard of the filling industry" for more than 70 years. Your FMC representative will gladly recommend an M&S Filler for *your product.* Won't you call him today?

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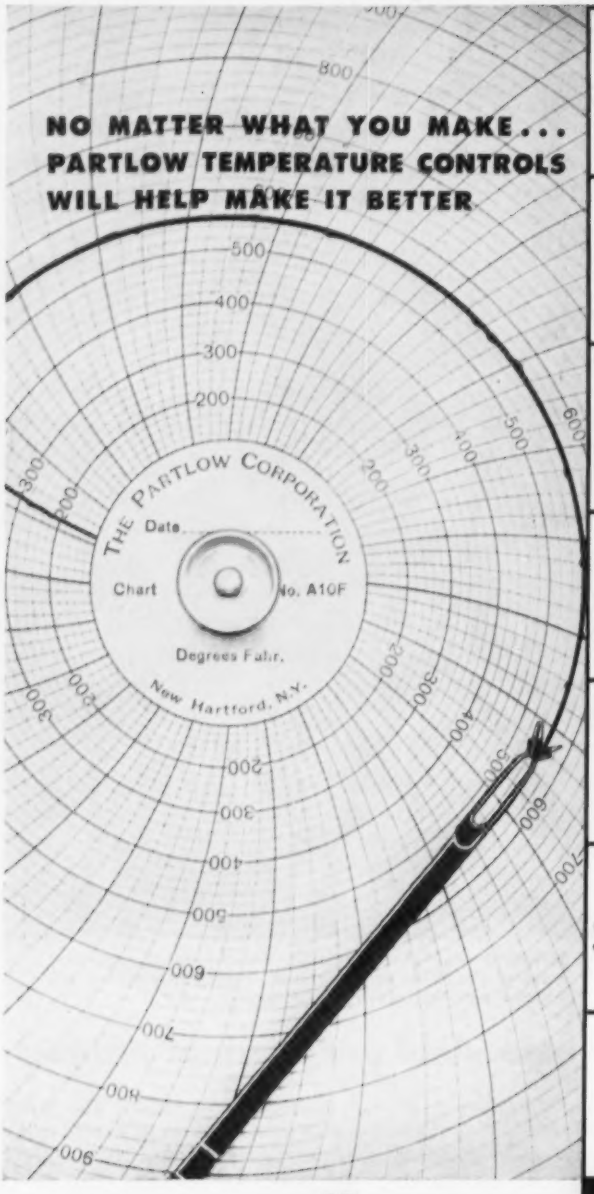

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mated 100 packers were producing frozen uncooked meat specialties as their principal business.

Freezing is a practical way to centralize fresh meat cutting, fabrication, and packaging operations. And it ties in with the trend to pre-fab, portion-controlled meats so much desired by institutions.

Freight savings through trimming the meat at packing plants may amount to $120 to $160 per car. Packers can recover about $7 more than retailers from the fat and bone trim of a 600-lb. steer. And labor costs would be reduced in retailing and restaurant preparation of fresh meats.

Additional investment in plant freezing equipment is estimated at $2 a lb. of daily capacity. An estimated 2,750 mechanically refrigerated railway cars will be required to move 3.3 billion pounds (1,037 were in operation at the first of last year, another 1,219 on order). Additional freezer space will be needed in warehouses, plus more low-temperature delivery trucks.

And more freezer display cabinets will be required in retail stores, or slow moving frozen products will lose out.

Preserves Gain 2 Percent

Consumption of jams and other fruit spreads increased about 2% in 1956, according to estimates by National Preservers Assn., and commercial output this year is expected to hold within the 800,000 to 900,000 lb. range of recent years.

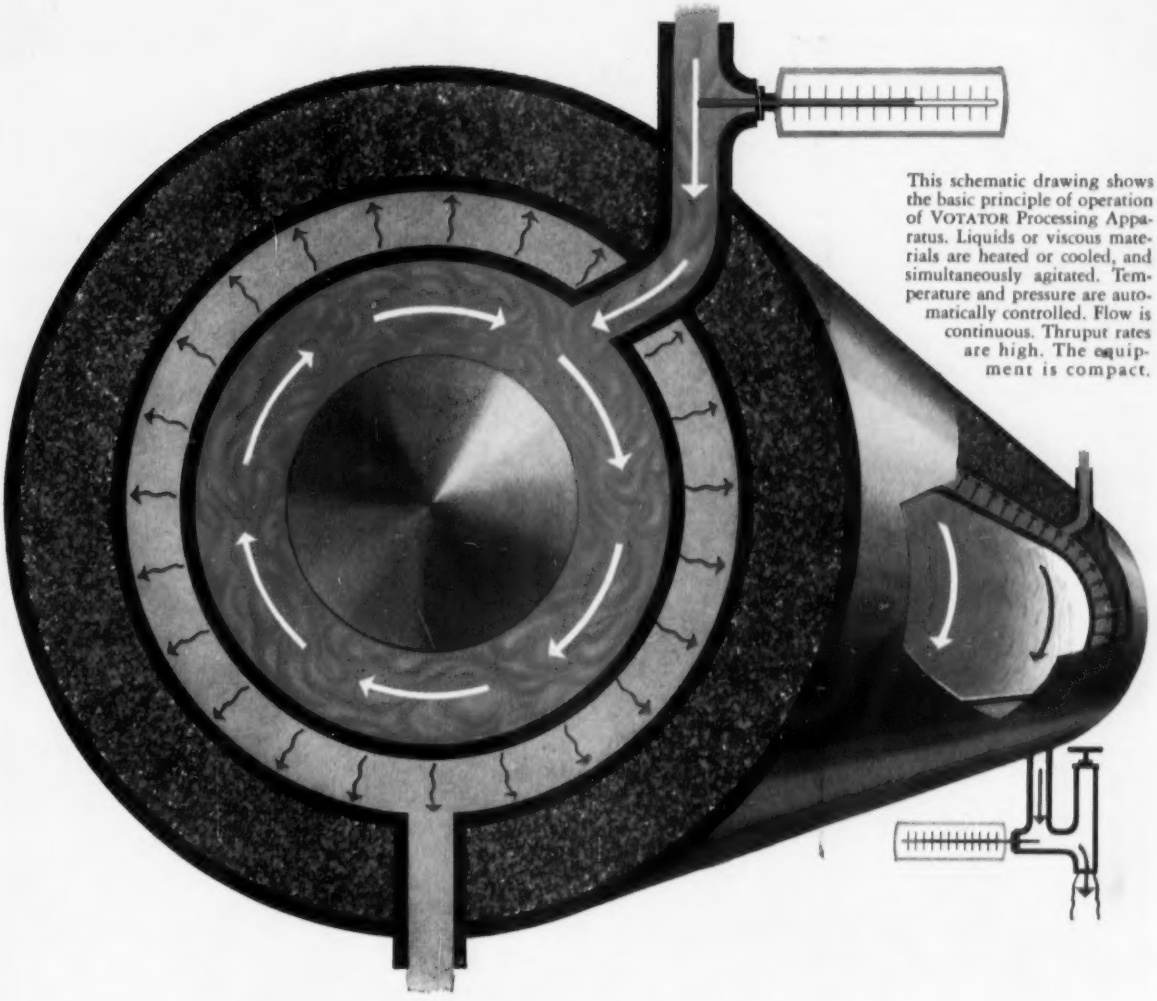
Preservers look hopefully for a continued decline in home canning of preserves.

See Better Beverage Year

American Bottlers of Carbonated Beverages expects 1957 sales volume of bottled soft drinks to top 1956 by at least 10%. The industry will back this optimism with record advertising outlays, giving heavy attention to promoting the 10- and 12-oz. "economy-size" bottles for home consumption.

Rising costs for sugar, machinery, and labor will show their impact in a continued moderate increase in soft drink prices.

The industry's sales showed a gain of 17 to 19% during the first half of 1956, but slumped when the next few months produced the coolest, wettest summer since 1949 in the traditional heavy consuming areas. As a result, estimates put the full year's sales gain at a modest 3 to 4%. However, the ABCB believes that



This schematic drawing shows the basic principle of operation of VOTATOR Processing Apparatus. Liquids or viscous materials are heated or cooled, and simultaneously agitated. Temperature and pressure are automatically controlled. Flow is continuous. Thruput rates are high. The equipment is compact.

This is continuous processing...

a proven way to increase profits

A host of food products are being made better and at lower cost with VOTATOR* Continuous Processing Apparatus. This heat-transfer equipment agitates and simultaneously heats or cools liquid or viscous materials. Its output rate is six to ten times that of conventional batch methods. The system is completely enclosed for absolute product cleanliness. Flow is continuous, automatically controlled for highest quality at all times.

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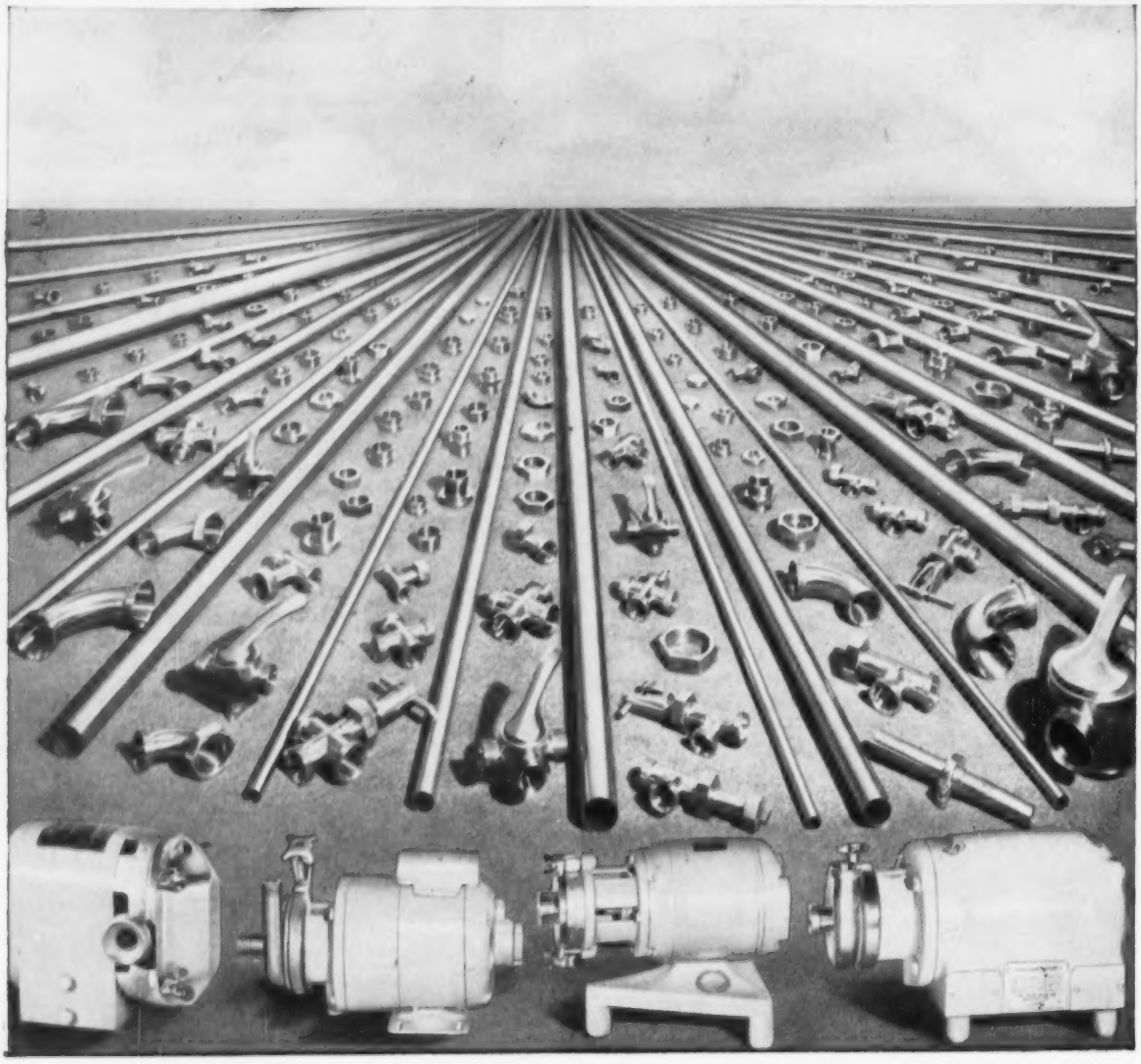


Pity the poor bacillus

All that beautiful metal . . . and no place for bacteria to hide in this mass of Cherry-Burrell stainless steel pumps, sanitary tubing and fittings.

No place at all because even the smallest bacteria have to have some crevice to get a toehold—and how can they when there are *no crevices, no pockets, not even a sharp corner?*

In the complete Cherry-Burrell line you'll find every valve and fitting you can possibly use . . . the pumps to push liquids through them . . . and the tubing to serve as sanitary highways to get your liquids where—and *how*—you want them.

Next time you want a single fitting or a carload of them . . . a short-length section of tubing or thousands of feet . . . centrifugal or positive pumps, discuss it with your Cherry-Burrell Representative, or write —

CHERRY-BURRELL
CORPORATION

427 W. Randolph Street, Chicago 6, Ill.

Dairy • Food • Farm • Beverage • Brewing • Chemical • Equipment and Supplies

SALES AND SERVICE IN 58 CITIES — U.S. AND CANADA

1957 sales will pick up the momentum generated in the first half of 1956.

Of major concern is a possible further tightening in sugar supplies. Soft drink makers estimate total domestic user needs for 1957 at no less than 9.1 million tons, but the government has set total domestic supply quotas at 9 million tons.

HORS D'OEUVRES

▶ **Housewives prefer an obviously "imitation" fruit flavor to one that really tastes like the fruit, Kroger has discovered. FDA please note.**

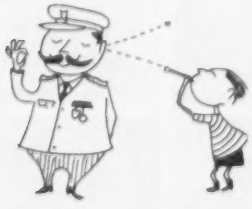
▶ National Biscuit added 206 varieties of products and dropped 547 in the past 15 years. Meanwhile, its sales have soared. Maybe food compaines need a man in charge of product undevelopment.

▶ **Corn was grown in America in 2000 B.C. Columbus discovered it 3,492 years later. Queen Isabella thought it a poor substitute for gold. Early settlers found it a priceless substitute for starvation. Take it from us today, and we may as well give the country back to the Indians.**

▶ Canned porcupine has been market-tested in Chicago. "It has some sort of wild taste, but is very good." That is, it prickles your appetite.

▶ **One nutrition specialist says that a fat-rich diet causes heart disease. Others report that fat is essential in a healthful diet. So keep your insurance paid and take your choice.**

▶ In the time of Queen Anne, great men of England were members of thriving steak-eating clubs. Now the great men eat crow.



▶ A British major complains that dry peas often won't fit his son's pea-shooter. A British pea producer explains that there are big marrofats and little "blues." So a big armament problem is posed. Should pea-shooters be built with two bores?

NOW . . . learn how

35 manufacturers saved with

CYCLONE Processing Belts!

This new booklet carries condensed case histories of manufacturers handling steel, foodstuffs, felt hats, china—in fact nearly *every* type of product. And it shows that in every case, Cyclone Processing Belts produced worthwhile savings for the user.

In some instances, Cyclone Belts saved material. Others saved time. Many eliminated breakage. And still others lowered labor costs. In *all* cases, *all* users had savings worth talking about. You have nothing to lose (the book is free) and everything to gain.

USS Cyclone Steel Processing Belts prove their point daily in plants across the country. One of the wide assortment of sizes, finishes or types can do an efficient job for you. Check into the matter by sending for your free booklet today.

CYCLONE FENCE DEPARTMENT
AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL CORP., WAUKEGAN, ILLINOIS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS CYCLONE METAL CONVEYOR BELTS
SPIRAL WOVEN
FLAT WIRE · FLEX-GRID

Mail this coupon today!

USS

Cyclone Fence, Dept. H-27
Waukegan, Illinois

Please send me your illustrated Belt Booklet. No charge or obligation.

Name .....
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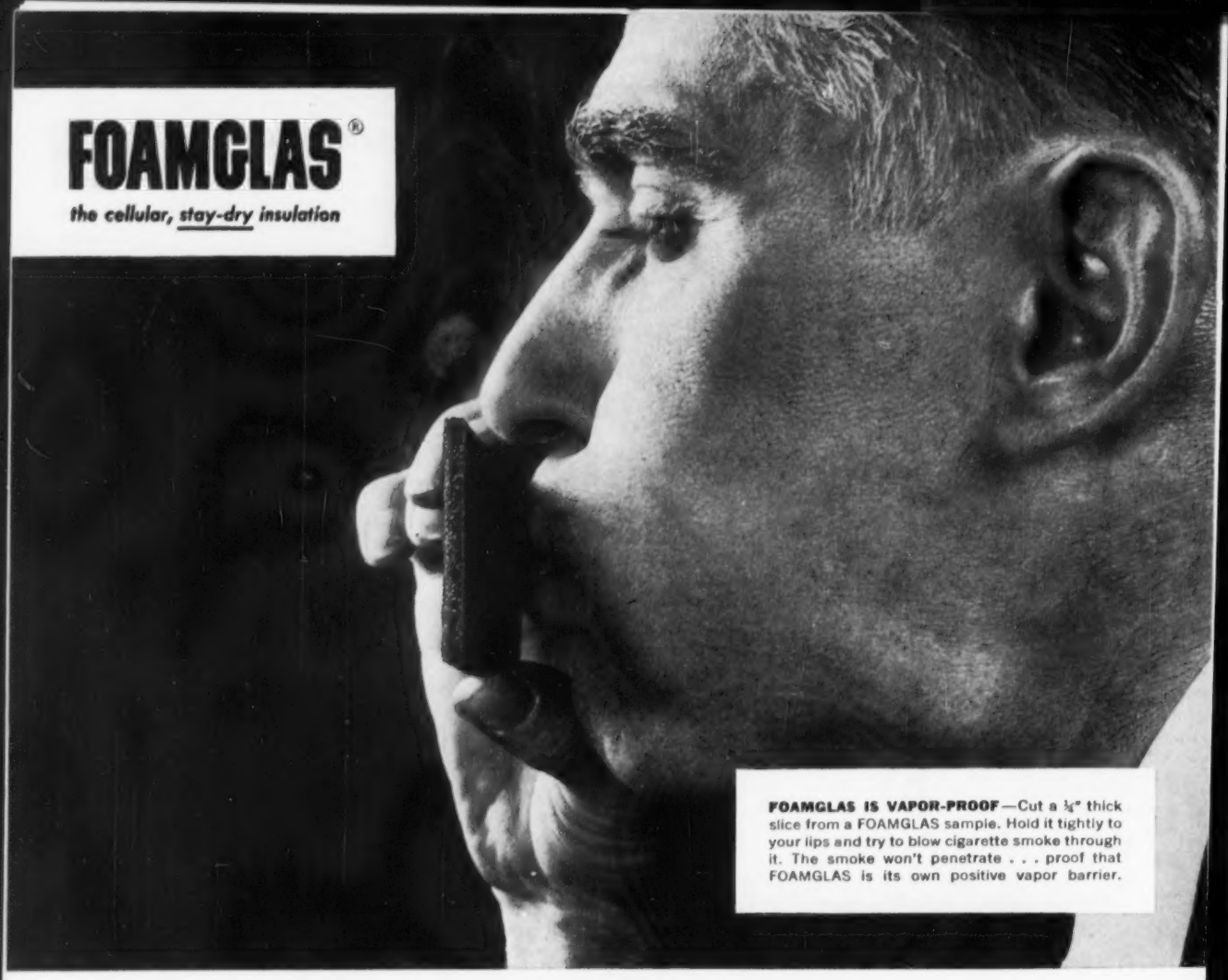
Address .....
City .....
State .....

UNITED STATES STEEL

FOAMGLAS®

the cellular, stay-dry insulation



FOAMGLAS IS VAPOR-PROOF—Cut a ½" thick slice from a FOAMGLAS sample. Hold it tightly to your lips and try to blow cigarette smoke through it. The smoke won't penetrate . . . proof that FOAMGLAS is its own positive vapor barrier.

Vapor can ruin ordinary insulations . . .

Prove to yourself that FOAMGLAS is vapor-proof!

Send for a sample and test it!

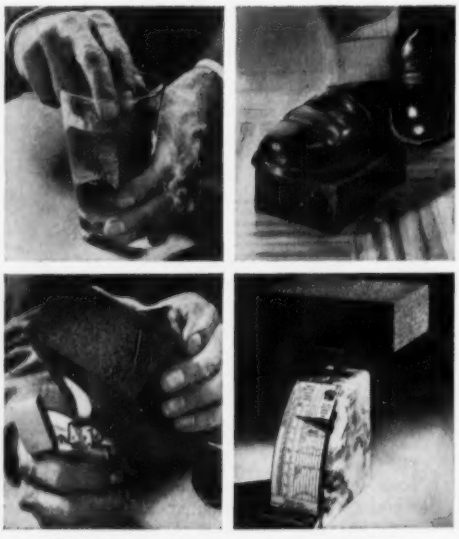
Nature exerts almost constant pressure to force heat and moisture vapor through a thermal insulation. Permeable insulations absorb that vapor. Even expensive vapor barriers cannot always insure absolute protection.

Once vapor enters an insulation —and condenses there—insulating value starts to nosedive . . . because moisture conducts heat. The *real* cost of a permeable insulation may multiply two or three times . . . in terms of lost insulating value and the resulting increase in heating and cooling costs.

That's why it pays to specify FOAMGLAS for true insulating economy. This unique all-glass insulation is naturally immune to vapor attack. Composed of millions of sealed cells, each a separate insulating unit, FOAMGLAS repels moisture in any form . . . liquid or vapor. Its insulating efficiency can never vary, and no costly vapor barrier is needed to protect it. Prove it to yourself with the simple test illustrated above.

In a few minutes, in your own office, you can test the whole combination of properties that makes FOAMGLAS unique among insulating materials. These properties have been proved not only by rigid scientific tests, but by hundreds of actual insulating applications. Send for a free sample and complete testing directions today. Address:

Pittsburgh Corning Corporation
Dept. O-27, One Gateway Center
Pittsburgh 22, Pennsylvania
In Canada: 57 Bloor St. W., Toronto, Ont.



FOAMGLAS is waterproof . . . strong and rigid . . . inorganic and incombustible . . . lightweight

PITTSBURGH PC CORNING ®
Also manufacturers of PC Glass Blocks

DEVELOPMENTS TO WATCH

Special

FOOD ENGINEERING

Service to Executives

Representative O'Hara has introduced a new food additives bill (H.R. 366). Its "grandfather" clause is somewhat closer to FDA's ideas than the old O'Hara bill. But the bill clings to the declaratory judgment trial procedure favored by many food spokesmen. And it requires no proof of functional value.

Believing that the now insignificant radioactivity of foods will increase as industrial use of atomic energy expands, FDA plans to keep 15 common items under continuous surveillance. Pre-1945 control samples are sought.

Food squeeze containers gain impetus as Swift introduces process cheese spreads in 8-oz. natural, transparent polyethylene tubes with screw caps. The cheese discharges in ribbon-like strips to be placed where wanted.

A polyethylene "bottle" in which foods can be steam-sterilized at 250 deg. F. for 30 min. has been announced by Continental Can's Plastic Container Div. The bottle can be attractively colored for eye appeal.

More efficient freeze-concentration is predicted for a new process involving dielectric thawing during centrifuging. Seems that radio-frequency waves selectively melt the frozen product along ice crystal boundaries to produce a solution containing relatively little water.

Precooked dehydrated food that can be readied for eating by addition of hot water to package is basic element of new Army combat ration. It is convenient, saves space and weight, requires no refrigeration.

Freeze-dehydration of meats may amount to more in future than many have been led to believe, says a meat scientist. Meat-vegetable combinations, like stews, may be freeze-dried instead of canned.

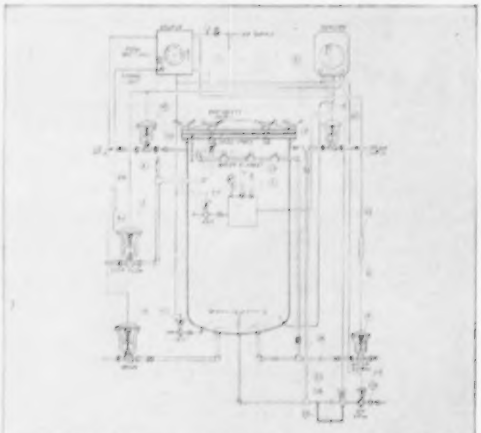
A new low-temperature, high-pressure moisture-removal process that improves shelf life, flavor, and solubility of oxygen-sensitive products—such as dried whole milk and eggs—is expected to start plant-scale operations this month.

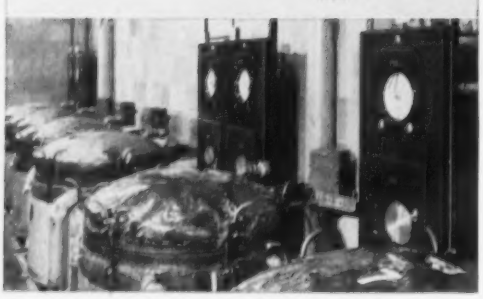
Deaeration of beer is achieved by ultrasonic vibration of filled bottles to produce air-purging foam. Bottle breakage caused by older bottle-tapping method is eliminated.

Watch for the first continuous, linear-flow process for tomato products to make its appearance this year. It will be built around a 6-stage evaporator and a new hot-break system.

Automation of paperwork in offices and plants is dawning. Electronic data recording and processing systems, leasible for a fraction of what they save, are coming into food company offices and plants.

Crash program for development of new uses for agricultural products has been instituted by USDA. Task groups to mastermind job are being manned from various branches of food industry.



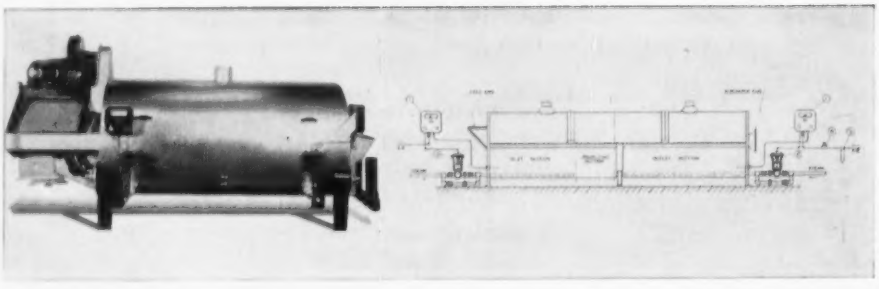


TAYLOR

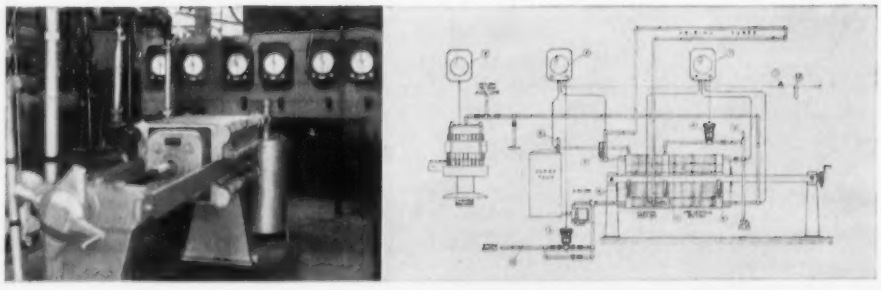
These 5 Taylor Control Systems Mean LOWER COSTS, HIGHER QUALITY, GREATER PROFITS

Taylor Fully Automatic Retort Control System can be changed in minutes from one form of cooking to another—steam, steam with pressure cooling, water with pressure cooling. Vent, cook, and cool time varied in seconds. *Controls temperature and pressure, operates agitation air, times entire operation.*

Dual Blancher Control System keeps operating temperatures correct throughout entire length of blancher under all normal load conditions by controlling the temperature—automatically—at both inlet and outlet. This is a rotary-type blancher, where the Taylor Control System *insures firmness, color, texture, reduces steam consumption, reduces manual supervision.*



Water Type Juice Heater Control System controls and records temperature of juice from exchanger to filler with control valve in raw-juice by-pass. Records temperature of juice in holding tubes and raw juice entering heater. Controls circulating water temperature. *Gives uniformly high quality, saves steam, eliminates manual operation and cuts "burn-on."*



Taylor Instruments

← For more data, circle this page number on card at back

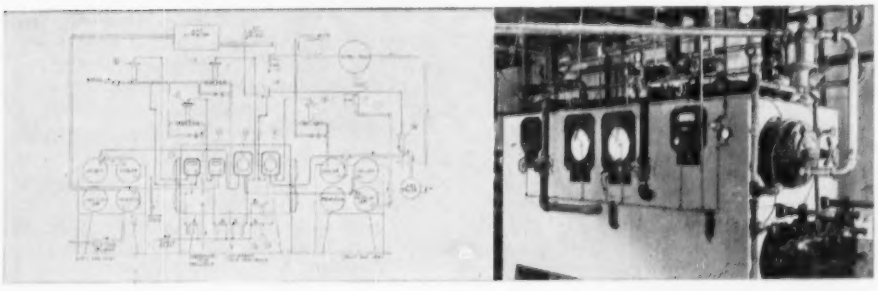
CUTS CANNING COSTS!

COSTS AND QUALITY—that's where the emphasis is in today's competitive food processing market. And that's where Taylor Control Systems work hard for you. In many cases Taylor installations like these have paid for themselves within a year thru savings in operator time alone.

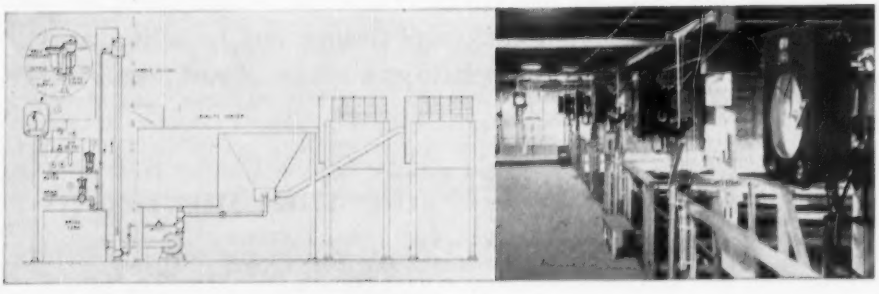
BE SURE TO VISIT OUR BOOTH at the Canning Show. A complete flow chart will highlight processing operations where Taylor instruments have been used successfully. Then check with your Taylor Field Engineer—or write for **Catalog 500.** Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

CANNING MACHINERY AND SUPPLIES ASSOCIATION 50th Anniversary 1907–1957

Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.



Steam Type Juice Heater Control System accurately maintains four distinct temperatures as juice passes through preheater, pasteurizer, holder and cooler. Keeps steady steam supply in preheater and pasteurizer. Diverts improperly processed juice for reprocessing. *Assures perfect sterilization and top quality processing.*



Brine Density Control System. High accuracy manometers measure brine density in Sight Feed Bubblers. Any density change is quickly detected, and a Recording Controller opens brine or water valves to restore correct value. Two throttling type control valves on brine and water lines are operated by same Controller but open one at a time. *Gives top yield of quality product—saves salt.*

MEAN ACCURACY FIRST

For more data, circle this page number on card at back →

You get *best rust protection* from

There's more zinc phosphate on every rust-inhibited US Steel container—both inside and out. This extra protection gets your product to your customers cleaner, and keeps it that way longer, because US Steel's extra thickness of zinc phosphate guards against rust *even after the container is open.*

Profit from these 5 US Steel extras, too:

- **Widest container variety**—from 2½-gal. pails to 55-gal. drums, including stainless.
- **Eye-catching containers** — your containers not only ship your product, but advertise it, too — when color-decorated by US Steel.
- **Job-tailored fittings** — a wide selection of fittings to choose from, others available to order.
- **Prompt container delivery** — a 7-point factory system gives you next-door service anywhere — any time.
- **Longer container life**—extra rust protection allows more safe refillings per container.

UNITED STATES STEEL PRODUCTS

DIVISION

UNITED STATES STEEL CORPORATION

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Los Angeles and Alameda, Calif. • Port Arthur, Texas
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USS STEEL DRUMS

USS

UNITED STATES STEEL

← For more data, circle this page number on card at back

CREATING THE PACKAGE

Employing tri-ply laminate of flexible films, processor . . .

Tames Hard-to-Handle Foods With a Big Pouch Pack

. . . that housewife just pops into her oven

DOWN IN NEW ORLEANS they're putting something new in flexibles—barbecued chicken and pork ribs, sealed in a laminated, liquid-tight pouch of acetate, aluminum foil, and polyethylene.

And judging by the local success the foods have had since they were introduced last April, they could sell very well in national distribution.

Time Saver Stores, Inc., a chain of five drive-in food markets in the delta city, puts up the products daily and markets them in refrigerated display cases.

Convenience, of course, is the main theme behind these specialties and their modern package.

That is, convenience for the retailer, who can thus display and sell a difficult product containing hard-to-hold spice flavors, grease, and moisture. And further, convenience for the housewife. For the superior protection afforded by this pouch permits her not only to freeze the products for extended storage—but also to cook them right in the bag, eliminating messy pans.

Printed, laminated, and fabricated by Continental Can Co., Shellmar-Betner Div., the pouches are delivered through the Columbia Paper Co.

Outer layer of the bag is acetate (Celanese Corp. of America). This 1-mil film is reverse-printed with the design in a gravure process.

Acetate was selected for several reasons: First, its sparkle and clarity boost impact of the design. Second, acetate will take intricate printing patterns, too. And last, stability of the film, combined with the reverse-printing technique, gives high protection against scuffing of the trademark.

Next, acetate film is adhesive-mounted on 0.00035-in. aluminum foil (Aluminum Corp. of America). The foil contributes both strength and impermeability to the package, plus a brilliant background and "show through" for the printed design.

A 1-mil polyethylene extrusion (du Pont and Bakelite resins) on the inner surface of the bag completes the lamination. It is added principally to provide a heat seal surface, but also serves to plug any pin-holes in the very-thin foil film.

The extrusion method of application by-passes use of adhesives, thus avoiding any contamination of food flavors and the necessity of clearing the adhesive resin with regulatory agencies.

The completed package forms a liquid and vapor-tight container. Inks are sealed off from both food and outside abrasion. And product is held in top-quality condition by the grease-resistant and tasteless films.

Time Saver loads the bags by hand, and applies a hand heat seal to the top edge. This method is dictated by the small, regional volume. Larger packers could put the entire forming and filling process under continuous, automatic control with equipment now available.

Design of the pouch—identical on both front and back panels—was worked out originally by the processor. Final layout was done by Shellmar-Betner.

Acetate is printed in three colors—blue, yellow, and red. The latter color is applied with a translucent ink, which allows the foil to show through just enough to make package gleam under display lights.

Other sections of the pattern are left blank, permitting foil to highlight the inked sections, and give the effect of a fourth color.

In the beginning the foods were wrapped in a special paper designed to withstand 300F oven temperatures, then enclosed in a carton.

Despite this combination's ability to take freezing temperatures equally well, the idea did not work out, because package could not be sealed tight enough to hold in juices.

Thus, the company continued its experimentation, which led to the present successful package.

NEW PACKAGES & PRODUCTS

Cheese in Plastic Squeeze Tube Now Marketed Coast-to-Coast

National distribution of Cheez Presto, a cheese topping packaged in a plastic squeeze tube, has been announced by Swift & Co.

Made in three flavors—Mild, Sharp Cheddar, and Bluelle, the cheese is specially formulated to its package so that refrigeration is not required.

The tube is of natural, transparent polyethylene. Bradley Container Corp. manufactures the tubes utilizing a patented European process. Each tube holds 8 oz. of the soft cheese and is printed in two colors with each flavor having a distinctive color combination.

A large, flat cap which is big enough for price stamping, covers the slotted tube opening.

Swift & Co., which processes and packages the cheese at its Green Bay, Wis., plant, conducted extensive consumer market tests before deciding to make the product available nationally.

Circle 20A on Reader Service Card

Tamper-Proof Candy Jar

Functional as well as attractive is an antique candy jar manufactured by Owens-Illinois Glass Co. Now used by Fresh Pak Candy Co., Rock Island, Ill., to package its line of hard candies, the jar has a high re-use appeal for the consumer.

The large glass stopper is held in place with a wide cellulose band that guards against tampering.

Circle 20B on Reader Service Card

Adds Instant Cake Mix

Lemon Flake is the newest member of the Swans Down instant cake mix family. The lemon flavor is obtained with natural lemon oil and lemon flakes.

The flakes remain suspended through the baking period and are visible in the finished cake.

Turkey for Two

Quick frozen turkey sandwiches have been introduced by Banquet Canning Co., St. Louis. Two buttered buns holding a combination of white and dark meat are packed in each carton.

Each sandwich is individually wrapped in foil before being placed in the clay-coated chipboard carton.

The sandwiches may be served hot or cold.

Apple Juice in Cartons

A number of dairies and fruit growers are now marketing apple juice in milk-style fiber cartons. American Can Co. is supplying the containers to processors in 1 pt. and 1 qt. sizes.

Among processors are Geiger's Cider Mill, H. P. Hood & Sons, and Sun Dew Corp.

Circle 20C on Reader Serice Card

tidbits or tokens . . .

M&M'S CANDIES AND PHILADELPHIA'S HANDY-PACK OF SCHOOL SUBWAY TOKENS . . . USE HEAT-SEAL POUCHPAK*. . . MADE, PRINTED AND POLY-COATED BY RIEGEL. *TM.

Whether you want to protect the sales-winning qualities of a toothsome product . . . or need to package something that's never been packaged before . . . you'll discover big savings in Riegel functional papers. Riegel does it for you by creating the right combination of the most efficient packaging materials . . . and by "tailor-making" the paper to run and seal at high speeds on your machines. Tell us what you want paper to do for you.
Riegel Paper Corporation, P. O. Box 170,
Grand Central Station, New York 17, N. Y.

Riegel PROTECTIVE PAPERS FOR PACKAGING

GLASSINES AND GREASEPROOFS
Plain • Waxed • Printed
Lacquer-Coated • Laminated

For more data, circle this page number on card at back →

new
TITAN*

EXPENDABLE TRAY PALLETS

Model P tray type

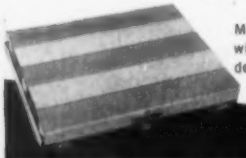
further step forward for shipping economy!

Ideal for bag, carton and bulk material shipping—low cost, rigid deck Titan* Expendable Tray Pallets offer big potential savings for almost any product handling operation.

Exclusive lip feature holds loads firmly, secures patterns ordinarily strapped or glued, and protect units in transit. Lightweight, and with 1 ton capacity they're easy to handle—perform without asking favors—stack four-high loaded.

Expendable, pallet return charges are saved, there's no maintenance or repair to anticipate, no expensive inventory records, control or bookkeeping system to maintain. Titan* Pallets store knocked down in 25% of valuable space usually allocated, assemble in seconds. Bought as needed, capital ordinarily tied up in pallet supply is used more productively.

Find out what these multiple Titan savings can mean in your operation. Send for information today.*



Model N Reversible with level deck inserts

TITAN*
TITAN PALLET CO., INC.
527 Madison Avenue, New York, N. Y.
*Keystone to modern shipping

Packages & Products

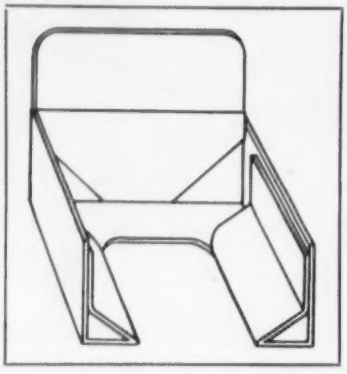
Fowl in Foil Envelopes

Pre-cooked barbecued spareribs and chickens sold by Time Saver Drive-In Stores, New Orleans, are being carried home by consumers in a novel package which serves for both storage and cooking.

Package is a laminated polyethylene, aluminum foil and acetate pouch (Continental Can Co.). The material seals in flavor and permits consumer to either reheat the food, or re-freeze it for later serving.

Label is rotogravure-printed in four colors. (For the full story behind package, see p. 19.)

Circle 22A on Reader Service Card

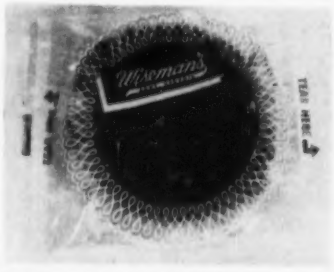


New Cushioned Tomato Tray

Developed by Standard Folding Trays Corp., New York City, a new produce package gives tomatoes protective cushioning and high product visibility. In addition, it reduces material and labor costs.

Trays are shipped flat. They are set up manually by lifting the ends and locking their tabs in the bottom. Set-up speed is about 50-60 per min.

Circle 22B on Reader Service Card



SALES INCREASE OF 800% has been reported by Wiseman Baking Co. for their 10¢ pies. The reason is a printed cellophane wrap made by American Viscose Corp. The pies are packaged on a Hudson-Sharp Campbell wrapping machine operating at speeds up to 120 per

Circle 22C on Reader Service Card

Jumbo Cheese Carton

A "Big Boy" quart size container which holds 2 lb. of cottage cheese is being manufactured by Continental Can Co. Designed to help dairies boost cheese sales without hurting sales of smaller packages, the carton may be equipped with either paper, metal, or polystyrene lids.

The lids are the same size used for the 16 oz. package. Containers are adaptable to automatic filling and capping equipment.

Circle 22D on Reader Service Card

Sausage Meat in Tubes

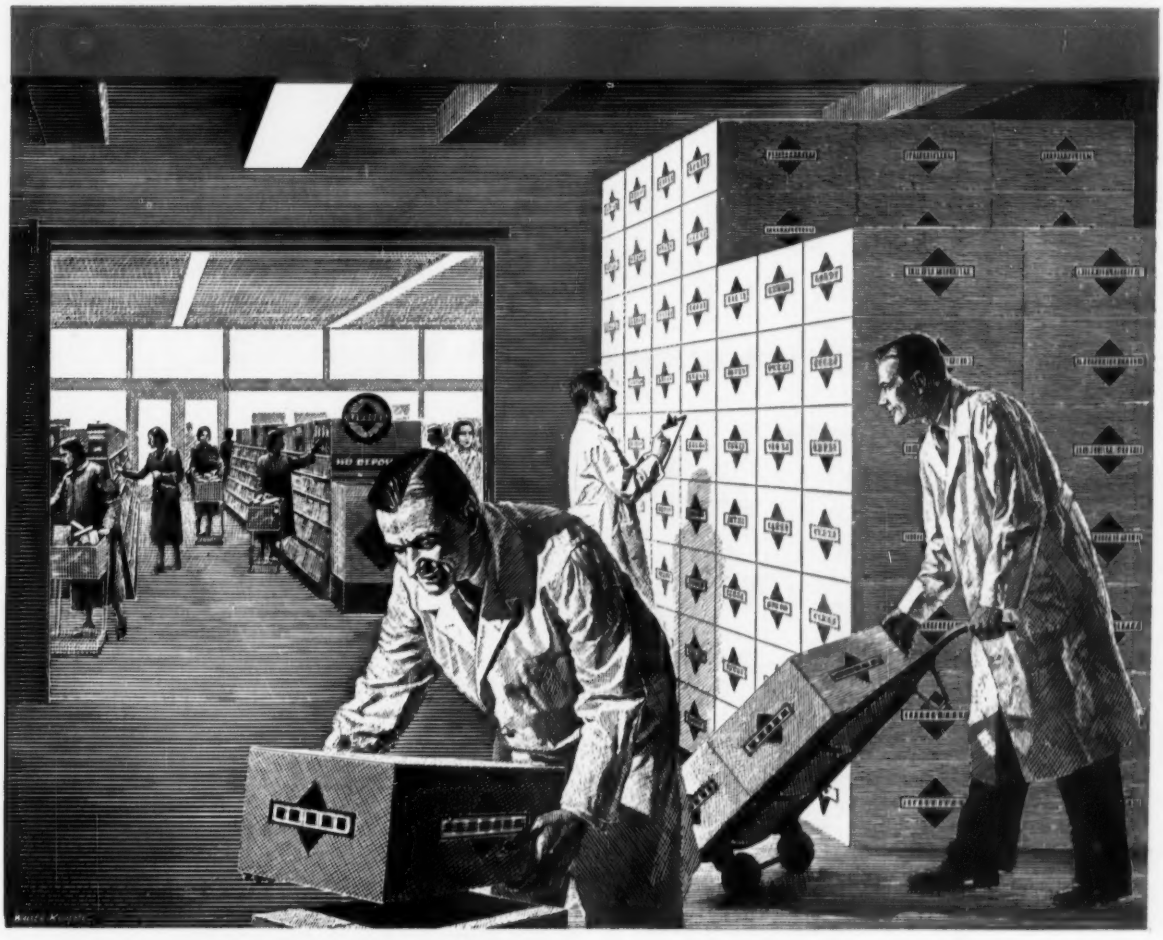
Hickory Hill Pork Sausage Patties are now packaged in a cylindrical fiber can with metal ends, opened with a handy draw-string. Lined with aluminum foil, the can has a replaceable cap for storage.

Consumer-Tests Products

An unusual new medium for consumer test-marketing is Holiday-Pak Inc.'s plan to distribute bags of food samples to movie-goers.

A selection of products ($1.50-2.00 value) will be distributed in a plastic bag. The system is scheduled to undergo its first New York City trial in early 1957.

Circle 22E on Reader Service Card



WIN IN THE BATTLE OF BRANDS

There are more than 150,000 brand names registered in the United States—competing for the customer's attention.

In this "battle of brands" brightly printed Gaylord Boxes are a vital link in the chain of visual impressions that pays off in sales.

This is true because Gaylord excels in printing. Gaylord has the specialized experience and equipment to make quality boxes do their selling best—with your brand name accurately expressed in eye-catching colors.

Put Gaylord Boxes on your selling team. Call your nearby Gaylord office.

Gaylord Boxes

CORRUGATED AND SOLID FIBRE BOXES • FOLDING CARTONS • KRAFT PAPER AND SPECIALTIES • KRAFT BAGS AND SACKS

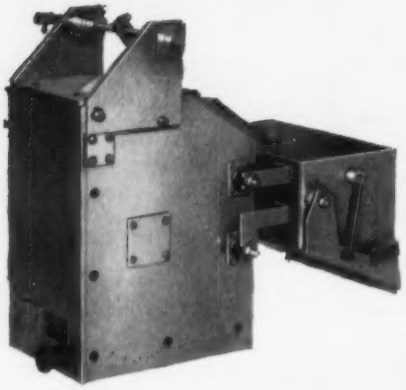
GAYLORD CONTAINER CORPORATION ★ ST. LOUIS

DIVISION OF CROWN ZELLERBACH CORPORATION

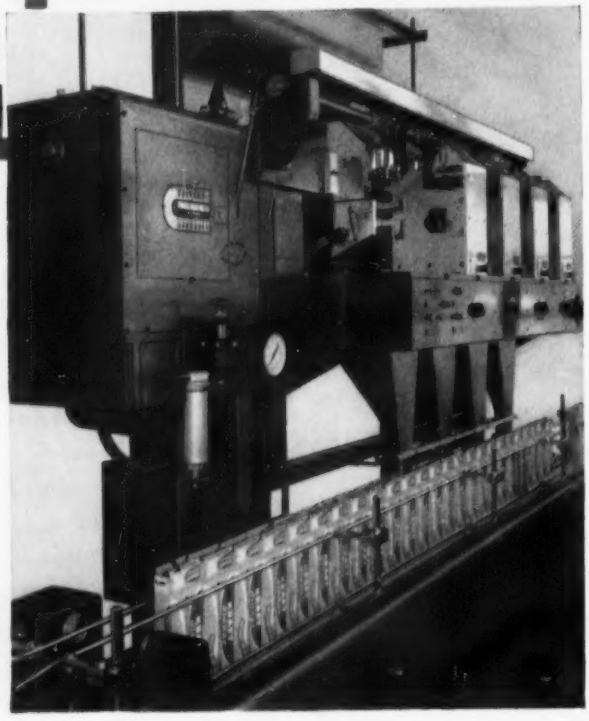
There's a

BETTER NET

for you, too—



IN THIS MAGIC BOX



PRODUCT net weight, we mean—a highly important factor to America's volume producers of packaged goods... because it can, and does, have a direct bearing on net profits.

PNEUMATRON provides net weighing accuracy never before available . . . using a new instantaneous pressure principle. The Pneumatron "head" contains a highly responsive cantilever assembly which moves only a few thousandths of an inch during the weighing operation—eliminating wear and friction. An extremely sensitive control device—an air jet—instantly detects and measures the position of the weighing assembly—keeps package contents within tolerances which are remarkably close.

That's PNEUMATRON, in brief. Now setting new standards of dependability and economy in the packaging of the products pictured above, it is the culmination of Pneumatic's years of specialization in the engineering and building of automatic packaging equipment. Such advanced design is characteristic of all Pneumatic equipment for bottling or packaging.

PNEUMATIC SCALE CORP., LTD., 91 Newport Avenue, Quincy 71, Massachusetts. *Also: New York; Chicago; Dallas; San Francisco; Los Angeles; Seattle; Leeds, England. Canadian Division: Delamere & Williams Company, Ltd., Toronto.*

★ PNEUMATIC *Packaging and Bottling Equipment*

Packages & Products

Steam-Sterilized Polyethylene

A linear-type polyethylene bottle which may be steam sterilized has been developed by Continental Can Co.'s Plastic Container Div. Accepted as a food container by the U.S. Food & Drug Administration, the bottles will withstand sterilization at 250 deg. for 30 min. without breaking.

The bottles may be colored.

Circle 25A on Reader Service Card

Doubles Dip Cheese in Wax

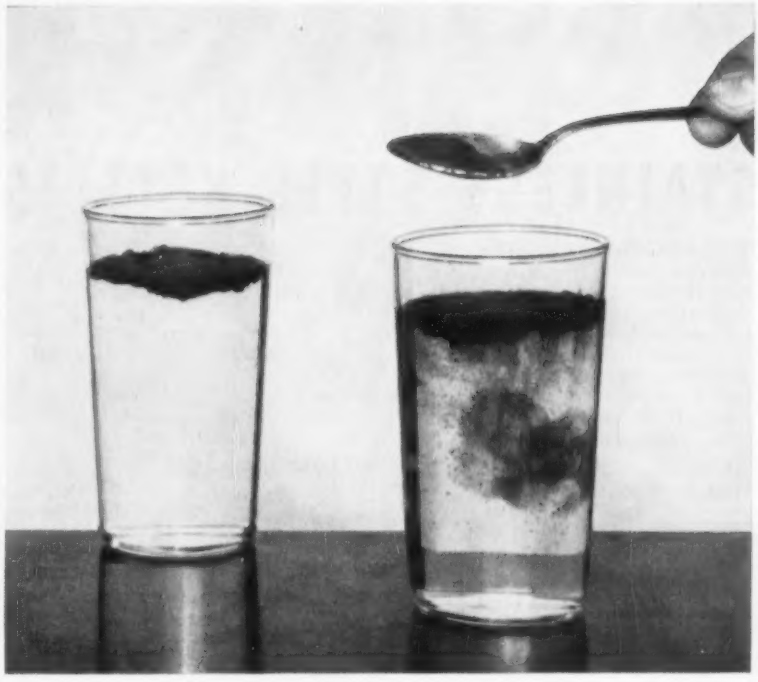
A double wax dip—both for product and carton—is reported to be guaranteeing freshness of Purity Cheese Co.'s blue cheese. After the cheese has been coated with a flexible wax, it is placed in a 2 oz. colorfully printed carton which itself is wax covered.

After a portion of the cheese "stick" has been used, the wax coating may be replaced over the cut end to preserve moisture and prevent crumbling.

Canned Game Hens

Boned and stuffed Rock Cornish Game Hens are now available in cans. The delicacy, processed at Idle Wild Farm, Conn., is heated before serving—each can holding enough for two people.

Three styles are canned: whole, boned, and stuffed with wild rice and



DOES WETTABLE COCOA INTEREST YOU?

What you see above is *pure cocoa* that has been solubilized by a very simple process

The new Blaw-Knox Instantizer and Solubilizer are able to do amazing things to many types of powdered foods among them, making cocoa wettable.

Perhaps your product is in this list. They all can be made at high production and with excellent quality.

WETTABLE COCOA FOR SALE TO OTHER PROCESSORS
VARIOUS CUSTOM BLENDS
INSTANT BREAKFAST COCOA
CHOCOLATE DRINK POWDER
CHOCOLATE MALTED MILK POWDER

The Blaw-Knox Instantizer performs a process of agglomerating a powder or dry-mix to make a homogenous type product with a decreased bulk density. Its ability to be reconstituted with ease really alters most user's concept of the description "Instant."

FOR FURTHER DETAILS AND LITERATURE, CONTACT: DEPT. FE

BLAW-KNOX COMPANY
DAIRY EQUIPMENT DIVISION
MORA, MINNESOTA

For more data, circle this page number on card at back →

HAMILTON
STAINLESS STEEL KETTLES

JUST think! Over three quarters of a century building fine cooking and mixing kettles for industry. These quality units, engineered and designed by the finest craftsmen, insure higher efficiency, labor-saving and cost-saving operation. There's no substitute for the best—"Hamilton." When it comes to mixing, the agitators, the drives are designed for longer life and these rugged sanitary units have proved themselves in operation. The Steam-Jacketed Kettles are fast-cooking, easy-cleaning, precision-built.

If it's the best you want—then you want "Hamilton," the foremost designers and producers of the finest kettles to mix and cook. There's a "Hamilton" to suit your specifications so why settle for anything but the best, a "Hamilton" Stainless Steel Kettle.

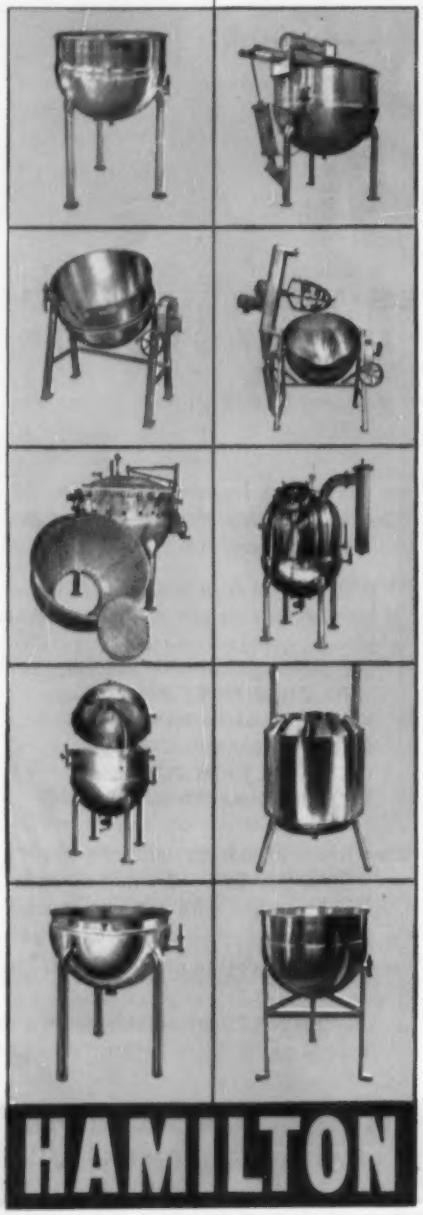
STYLE SA
Streamlined design, balloon gasket. Extra large diameter provides greater heating surface, efficient cooking. Sizes range from 15 to 500 gallon. A.S.M.E. Code constructed for steam working pressures of 40, 90 and 125 pounds.

STYLE CW
Designed to process large batches up to 150 gallons. Positive worm gear and handwheel give complete control of large capacity loads while tilting. Large diameter kettle gives fast, even cooking. Sizes from 30 to 150 gallons.

STYLE PC
Stainless steel pressure cooking kettle, designed especially for meat and poultry processing. Balloon jacket gives increased heating capacity. Built for 90 p.s.i. in jacket and 15 p.s.i. in kettle. Has quick opening latches. Top is lifted by eccentric lever. Sizes 30 to 250 gallons.

STYLE VT
For small batches this unit has no equal. Vacuum cooker with tilting top, easy loading. Sizes from 30 to 150 gallons. Sanitary design throughout. Jacketed for 90 p.s.i. steam working pressure.

STYLE SB
Shallow type kettle with balloon jacket. Streamlined for complete sanitation. A.S.M.E. Code constructed for working pressures of 40, 90, and 125 pounds. Sizes range from 15 to 350 gallons. Larger size kettle can be furnished to meet specifications.



STYLE SA MIX COOKER
Standard SA Mix Cooker has either single motion or double motion agitator with or without hydraulic lift. With hydraulic lift agitator lifts easily and smoothly out of cooker. Sizes range from 30 to 500 gallons.

STYLE CW MIX COOKER
Large diameter gives fast even cooking. Hydraulic Lift tilts agitator smoothly and easily out of tilting kettle. Available for 40, 90, 120 pounds steam working pressure.

STYLE HV
A vacuum cooker for large capacities from 150 to 500 gallons. A hinged manhole is provided for access to the inside. Available with a mixer — circulator can be installed to increase heat transfer and agitation.

CIRCULATOR
Stainless steel steam immersion heating unit can be installed in any kettle regardless of size or shape. Gives extra heating surface at the center of kettle. Creates thermal agitation. Speeds up cooking 45%.

STYLE A
General purpose steam jacketed kettle used in processing food, drugs, and chemicals. Full ½ jacketed. Sizes range from 15 to 500 gallons. Also available in Type 316 stainless steel or nickel. Larger sizes to meet specifications.

KETTLE SPECIALISTS

HAMILTON

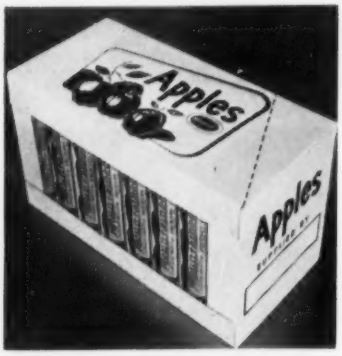
SINCE 1876

DIVISION OF BRIGHTON CORP.... 820 STATE AVENUE ... CINCINNATI 4, OHIO

Packages & Products

cognac; hunter style; and creamed.

Four canned soups have been introduced to supplement the main dishes. These are onion, cream vichyssoise, rock cornish game soup, and creamed rock cornish game soup. Also sold is a rice cream pudding.



Rugged Apple Shipper

Visibility as well as protection for carton-packed apples is offered with use of a new shipping container developed by Continental Can Co.'s Robert Gair Div.

Shipper is one-piece, wrap-around construction without sidewalls. It holds 16 cartons of apples. White linerboard is used to provide a good printing surface and add sales appeal.

Before filling, flaps of the top, bottom and end panels are stapled together at one side. Cartons are filled in at the open side. The remaining flaps are then stapled and the shipper is ready.

Circle 26A on Reader Service Card

EXTRA-LONG WIENERS labeled as Lankfurter-Franks are a product of Lohrey Packing Co., Cincinnati. The unusually long and slim frankfurters are overwrapped with semi-moisture proof cellophane on a waxed backing board.

PERFECTION IN "AUTOMATION" FOR FROZEN FOOD PROCESSORS IS THE PURPOSE OF THE

Amerio

"AUTOMATIC" CONTINUOUS FREEZING PROCESS

WITH DOUBLE CONTACT PRESSURE PLATE FREEZERS

Manufactured under U. S. Pat. No. 2697920 and other pats. pending

The practical application of "automation" in freezing plants is further made possible by the development of an automatic, continuous, loading—freezing—unloading, double contact pressure plate freezer by Amerio.

These freezers provide for continuous operation, are "automatically" loaded from the overwrap machines—frozen under pressure—and automatically discharged for casing with the elimination of hand labor. In addition, each freezer is entirely portable and can be moved from one location to another, or incorporated in any floor plan that may be changed from time to time.

Photo Courtesy of O'Donnell-Usen Fisheries "Taste O'Sea".

Amerio offers the nearest approach to "perfection", based on sound engineering, experience and expert craftsmanship. The Amerio "Automatic"—Continuous Double Contact Pressure Plate Freezer accords Frozen Food Processors the utmost automation in the fastest, finest freezing of consumer and institutional packages. See it at the conventions.

Designed for direct connection to Refrigeration Systems. Send for details TODAY.

Amerio
Contact Plate Freezers Inc.
Union City, N. J.
"It's the Contacts that Count"

For more data, circle this page number on card at back →

Aluminum Foil Packaging as Protection Against Contamination

Report No. 7 of a Series by Reynolds Metals Company

Contamination in packaged goods is usually taken to mean the introduction of harmful impurities into originally pure package contents. This can occur in three ways. One, contamination may take place *through* the packaging, from the outside. Two, it may be caused by some taste or odor generated by the packaging material itself. Three, it may be caused by microorganisms which find lodging in the surface of a packaging material.

In countering all of these possible causes of contamination, aluminum foil rates very high. Its efficiency is attested by the widespread use of foil packaging among food processors, who are always zealous in safeguarding the quality of their products. Aluminum foil's freedom from contamination and resistance to contaminants are properties well recognized by homemakers in their daily use of Reynolds Wrap, pure aluminum foil, in their own kitchens.

In preventing contamination by the first method named above, aluminum foil acts as a *barrier*. Here it excels. It not only protects package contents from such outside contaminants as dust, liquids and air borne impurities; it also performs the tougher jobs of protecting against moisture vapor, noxious gases and odors. An example of such protection is the use of aluminum foil for packaging butter and margarine – products highly susceptible to absorption of foreign odors and flavors.

The attached graph compares the score* of butter wrapped in foil with butter wrapped in a commercially used parchment paper, during a three-day exposure to garlic odor.

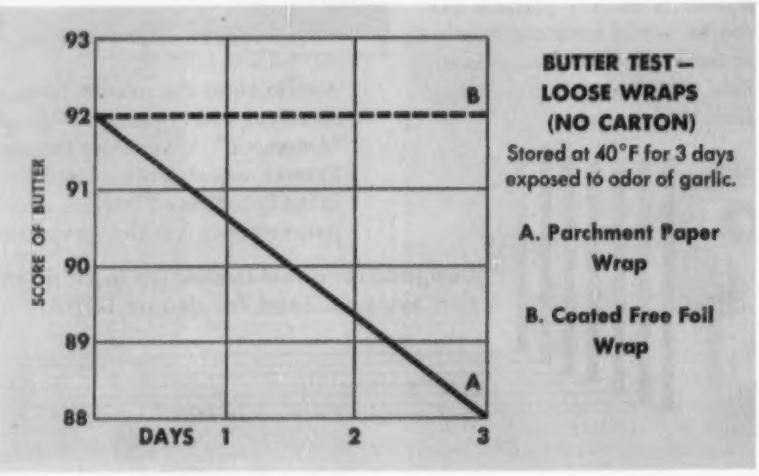
As to contamination by the packaging material itself – this, of course, is not possible with aluminum foil. Naturally free of any taste or odor, aluminum foil will not develop off-tastes or odors even under extreme temperature variations.

Aluminum foil is also completely non-toxic. This is readily apparent from the long established preference for aluminum cooking utensils and from the more recent and fast growing use of aluminum foil containers for heat-and-serve food products. Aluminum foil is officially accepted by the Pure Food and Drug Administration of the United States Department of Agriculture, which prohibits the use of toxic materials for food packaging.

The third indicated method of contamination – by microorganisms on the surface of a packaging material – is defeated by the pure metallic surface of aluminum foil, which does not support growth of molds, yeast or bacteria. Furthermore, the annealing process for aluminum foil subjects the material to temperatures far in excess of those necessary to destroy any microorganisms.

Reynolds research facilities and experience in solving particular packaging problems requiring the utmost in protection against contamination are available through Reynolds regional representatives. Or **Reynolds Metals Company,** General Sales Office, Louisville 1, Ky.

*Score is a measure of butter quality premised on a maximum rating of 100.



©Reynolds Metals Company, Louisville, Kentucky

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Oysters in Shocking Pink

For the trade that buys them by the case, Haines Oyster Co., Seattle, is going to pack oysters in wooden boxes dyed a shocking pink.

The pink, Haines feels, gives the product an elegant touch.

Seattle Box Co. who makes the containers, believes it is first company to offer colored wooden boxes. The firm expects them to be used for quick identification as well as for glamorizing the product.

Other successful shades emerging from Seattle Box dyeing experiments: purple, green, gold and blue.

Circle 29A on Reader Service Card

Cones in Windowed Carton

Spurred by consumer use of freezers to store large quantities of ice cream, Krispy Kake Kone Co., Los Angeles, is marketing twelve sugar cones in a windowed carton. The label is gravure-printed on cellophane, overwrapping a plain cardboard carton.

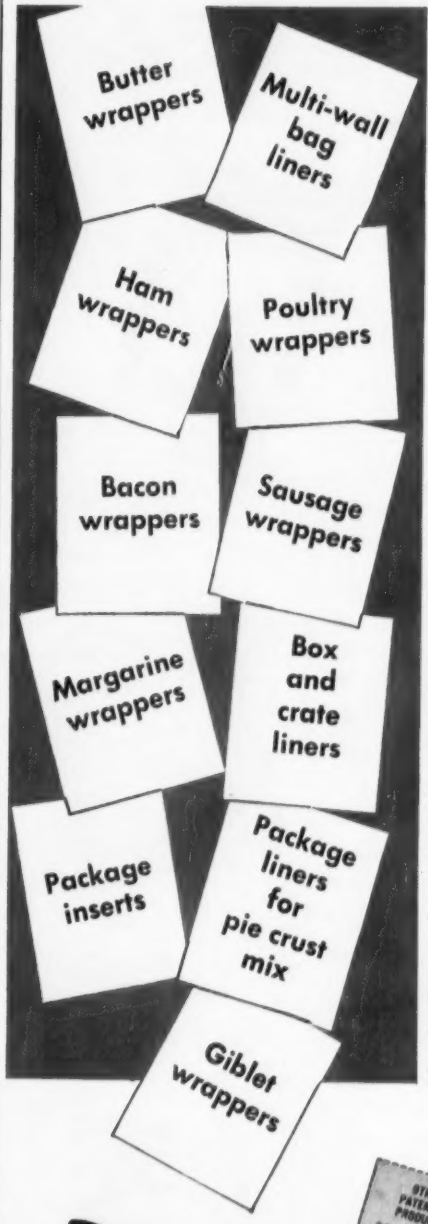
New Product Shorts

Frozen Fruit Pies processed by General Foods' Birds Eye Division now include apple, blueberry, cherry and peach.

Maple Spread in round waxed cartons is newest product of Vermont Maple Orchards.

White Corn Bread Mix of Quaker Oats Co. is currently undergoing market testing in Ga. and Miss.

If you package foods, Patapar® can be good news for you!



Available in many different types, Patapar Vegetable Parchment offers unique qualities as a packaging material. It has high wet-strength plus high resistance to grease, fats and oils. Made from pure cellulose, Patapar is odorless and completely non-toxic. It handles easily on all types of packaging equipment.

It meets every requirement of the Federal Food and Drug Act.

Furnished plain or exquisitely printed

Patapar comes to you plain or beautifully printed by letterpress or lithography. We will reproduce your present design or create a colorful new one for you.

Send for samples

Write us on your company letterhead, telling your requirements.

Patapar®
Vegetable Parchment
HI-WET-STRENGTH · GREASE-RESISTING

OTHER PATERSON PRODUCTS
*PATAX waxed paper
*DURAPAK parchmentized cellulose
*PATERSON absorbent paper
*PARCHKIN art parchment

PATERSON PARCHMENT PAPER COMPANY
Bristol, Pennsylvania
Sales Offices: New York, Chicago
West Coast Plant: Sunnyvale, California

HEADQUARTERS FOR VEGETABLE PARCHMENT SINCE 1885

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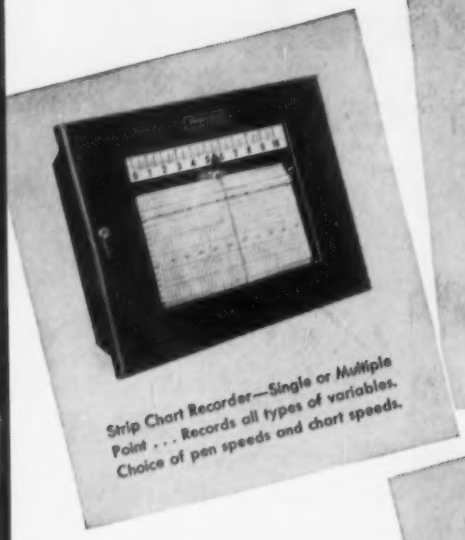
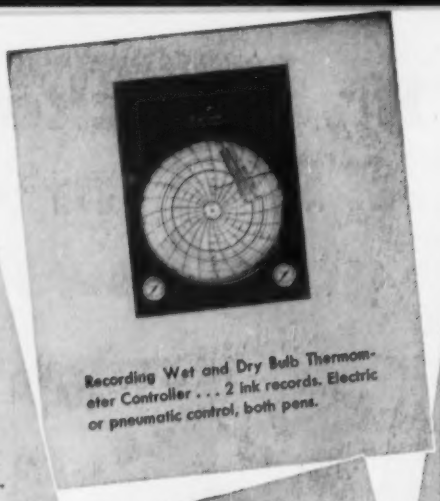
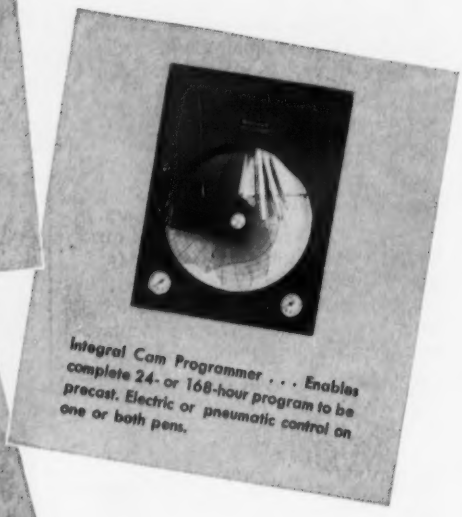


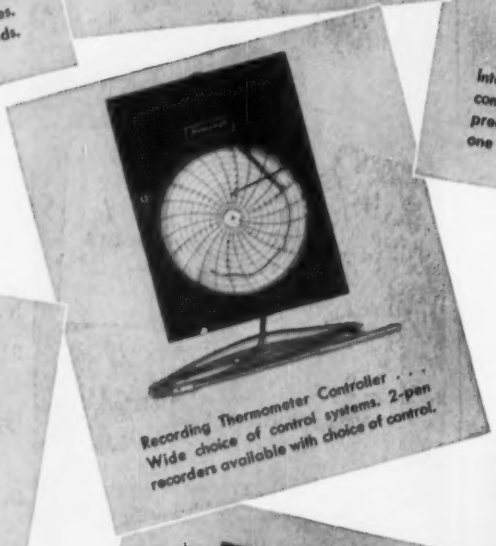
Strip Chart Recorder—Single or Multiple Point . . . Records all types of variables. Choice of pen speeds and chart speeds.



Recording Wet and Dry Bulb Thermometer Controller . . . 2 ink records. Electric or pneumatic control, both pens.



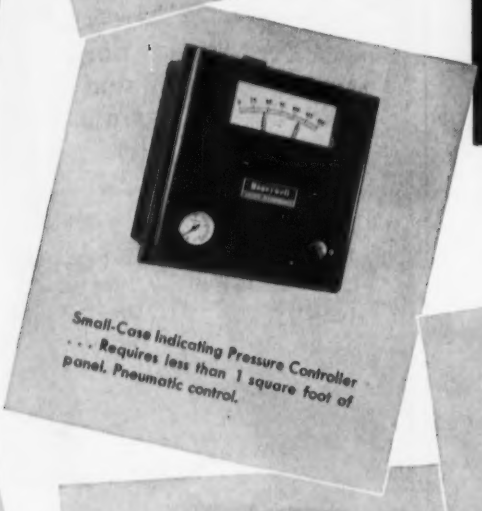
Integral Cam Programmer . . . Enables complete 24- or 168-hour program to be precast. Electric or pneumatic control on one or both pens.



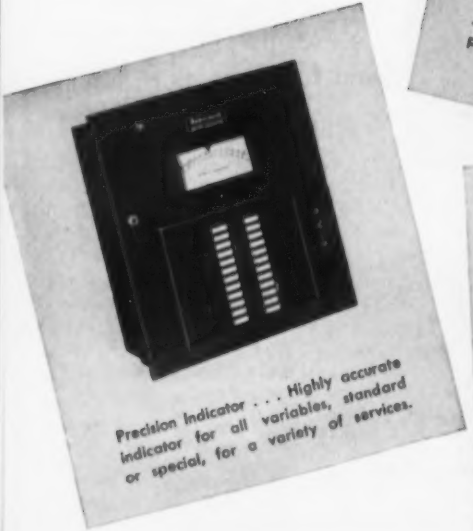
Recording Thermometer Controller . . . Wide choice of control systems. 2-pen recorders available with choice of control.

Circular Scale Controller . . . Scale is over 2½ feet long. Rotates to align indices for 12 o'clock reading. Available in all electric control forms.

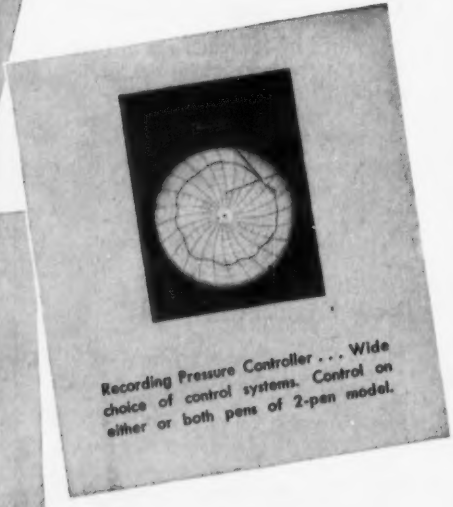
One-



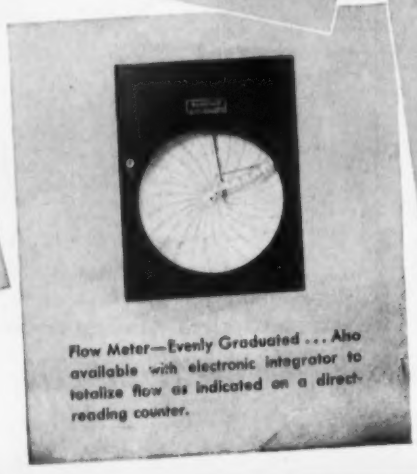
Small-Case Indicating Pressure Controller . . . Requires less than 1 square foot of panel. Pneumatic control.



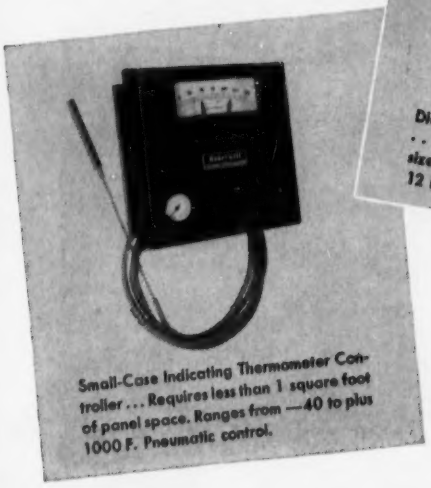
Precision Indicator . . . Highly accurate indicator for all variables, standard or special, for a variety of services.



Recording Pressure Controller . . . Wide choice of control systems. Control on either or both pens of 2-pen model.

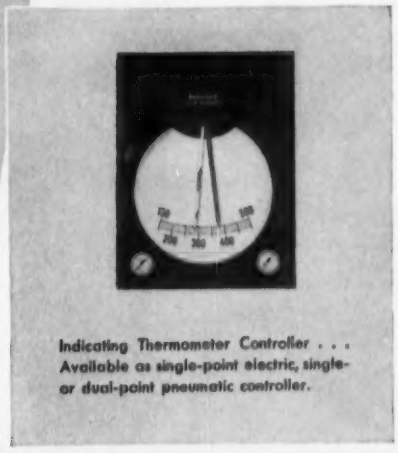


Flow Meter—Evenly Graduated . . . Also available with electronic integrator to totalize flow as indicated on a direct-reading counter.



Small-Case Indicating Thermometer Controller . . . Requires less than 1 square foot of panel space. Ranges from —40 to plus 1000 F. Pneumatic control.

Diaphragm Control Valve—Series 800 . . . For heavy-duty service. In standard sizes from 1 to 8 inch single seated—to 12 inch double seated.



Indicating Thermometer Controller . . . Available as single-point electric, single- or dual-point pneumatic controller.

-Stop SHOPPING...

WHETHER it's temperature, pressure, pH, flow, liquid level, humidity, or any other important variable you want to measure or control, Honeywell makes just the instrumentation for you. Our line is as broad as the food industry's requirements . . . you can choose exactly what you need.

This means you get all the instrumentation your process requires from a single source, so there is undivided responsibility for the complete installation. And you are assured that equipment suggested for your process is recommended without bias. With a complete line there is no need to over-sell or under-equip.

For the new process, the modernization program, or a replacement problem, find out how Honeywell can go to work . . . anywhere in the food industry. Call your nearest Honeywell sales engineer. He's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

H HONEYWELL

MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

First in Controls

B.F.Goodrich

Pecans by the ton travel on B. F. Goodrich belts

A typical example of B.F.Goodrich product improvement

THREE tons of shelled pecan meats a day flow through this plant—twice as much in peak seasons. But belts were being replaced every four to six months.

Keeping them clean took time and money. Oil from the nuts soaked into the belts. Some belts got soft and sticky. Others hardened and cracked. All kinds of belts from many manufacturers were tried.

Then a B. F. Goodrich distributor heard about the problem. He recommended B. F. Goodrich belts made of Koroseal flexible material, and the trouble disappeared like magic. B. F. Goodrich had developed a belt that stands nut meat oils, cooking oils, animal fats, most acids and just about everything else that ruins belts. The belts are as clean as your dishes at home and just as easy to wash. They have no odor, no taste, never get rancid. Food particles, even shells, can't grind in. In the pecan plant these belts had already lasted 50% longer than any others when this picture was taken, and still looked good for years of service.

Other kinds of B. F. Goodrich belts handle iron ore, coal or rocks instead of pecan meats. B. F. Goodrich has also made improvements in those longer, heavier belts to make them last longer, save money for users. B. F. Goodrich has made improvements in V belts, in dozens of kinds of hose and just about every other kind of industrial rubber product. If you use any kind of rubber, call your B. F. Goodrich distributor. Let him tell you which B. F. Goodrich product will do your job best. Or write *B. F. Goodrich Industrial Products Company, Dept. M-864, Akron 18, Ohio.*

Koroseal—T. M. Reg. U.S. Pat. Off.

B.F.Goodrich

INDUSTRIAL PRODUCTS

"As for No. 9," cautioned Ole, "I urge you to make very sure of your facts first."

What's "Fair Play" in Talking to Workers?

IVAN C. MILLER
"Food Engineering"

TOM WATSON was smacking his lips. "Take it from me," he said, "this has *really* been a banquet!"

Satisfied smiles also lit the faces of the other Guff & Griper guests seated around the table in the private dining room of the Metro-Cosmo Club.

"Well," grinned Host Bertram Barnastian, "nearly every dish the Club has served you here today has come from our Barnastian Bros. line of convenience foods—just as I promised. Certainly glad you like 'em.

"And speaking of convenience," he went on with a smile, "I'll remind you that this very occasion was selected as a convenience—that is, for Ole to finally round off our several discussions regarding what to do when the union 'campaigns' your plant.* Specifically, he's promised to highlight the general rules covering what management men should or shouldn't say to employees just prior to the plant vote on unionization."

"The points also apply," interjected Ed Strong, "to periods of contract negotiations, and likewise at times when a strike is threatened."

"Okay," broke in Batt Bulwark. "Let 'er rip, Ole! And lay it right on the line!"

"Glad to," replied Ole with a grin. "First, though, I'd like to offer the reminder that some statements made by management in the past *weren't* upheld—instead, were ruled against by NLRB or the courts.

"And now to some of those general rules: An employer has the right to engage in free speech on labor relations matters. That right is guaranteed by the Constitution and was reasserted in the Labor Management Relations Act of 1947 by a provision . . .," Ole paused and searched through his notes. "Here it is . . . by a provision that reads—

> **'The expressing of any views, arguments, or opinions, or the dissemination thereof, whether in written, printed, graphic, or visual form, shall not constitute, or be evidence of, an unfair labor practice under any of the provisions of this Act, if such expression contains no threat of reprisal or force or promise of benefit.'**

"That sounds clear and simple," he continued. "And yet that section of the law has been complicated by a myriad interpretations and rulings. To put it briefly, though, it means management may make any statement any time, so long—as it says here—that it 'contains no threat of reprisal or force or promise of benefit.' That means to avoid the sort of

* Recent Ole Sage Episodes relating these sessions have been: "What Tactics Are Best When Union Organizers Call at Your Plant? (Nov. FE); "What Should You Do Before Workers Vote On the Union Question?" (Dec. FE); and "How Avoid Charges of Discrimination?" (Jan. FE).

Presenting Automatic's

ALL NEW Stacker Model

Transporter

Completely Redesigned...New in Every Detail

Lowest priced stacking equipment of its kind that handles all kinds of pallets. The TRANSPORTER Stacker sets standards of economy, maneuverability, safety and low cost maintenance not matched in any comparable truck.

Among other improvements are fastest lift, for speedier stacking...shortest overall length for easier maneuvering...split ring bearing race reduces steering friction, makes turning easier...dual tilt rams increase load stability...easy access simplifies maintenance, cuts cost...improved weight distribution insures greater overall stability and safety.

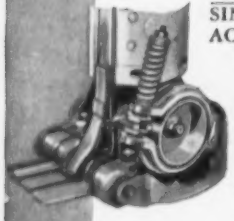
But there are many more features, all equally important to every industrial truck user. Write for complete details.

BALL BEARING ROLLER-MOUNTED CHANNEL AND CARRIAGE
Heavy action, rolled manganese alloy steel uprights offer superior rigidity and strength... negligible friction and wear...need little or no maintenance.

Exclusive New Features Simplify Operation and Maintenance... Reduce Down Time...Cut Costs

ALL NEW 3-SPEED BUTTERFLY CONTROL
Prevents too-fast starts... permits inching with smoothness and precision never before possible.

ALL NEW SIMPLIFIED FULLY ENCLOSED ALL-GEAR DRIVE
Extreme simplicity permits extra-heavy construction—tremendous reserve strength—effective insurance against down-time.



ALL NEW SIMPLIFIED HANDLE ACTUATED BRAKE
New simplified design permits smoother, more positive action. Spring pressure is adjustable to meet special requirements.

Write Today for Complete Specifications

Automatic
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Chicago 20, Illinois

WORLD'S LARGEST EXCLUSIVE BUILDER OF ELECTRIC-DRIVEN INDUSTRIAL TRUCKS

thing that would, as the lawyers put it, interfere with, restrain, or coerce employees in the exercise of those rights guaranteed to them in. . . ," he looked down at his notes. . ." in Sec. 7 of the Act.

"To expand on that, management has the right to state to employees its views on labor matters and its attitude toward labor unions. Also it can comment on, or answer, any questions that may have been raised by the union while it was trying to organize the employees. Further, it may legally advise employees of the status of bargaining during negotiations with the union. And it may state to striking employees its explanation of the issues—may even appeal to their reason and judgment."

"Seems to me," complained Batt, "that this discussion always takes in more territory than I'm ready for. I ask you, Ole—are there any limits to these statements management can make? And if so, what are they?"

Ole chuckled. "No, there aren't any limitations on either the content or the nature of the statements —so long as they are not coercive. The 'don'ts' actually are few. But you can certainly see that it would be impossible to offer a single brief summary covering the character of all statements that are privileged."

"How about giving us at least an idea of a few of them?" coaxed Batt.

"Well, I figured on doing that," said Ole. "Here on this poster-card I've put down ten of them—representative of the kinds of employer statements held to be privileged."

Several of those around the table poised pencils over notepaper as Ole lifted the card so it was visible to all. It read—

An employer or a member of management may . . .

1. Express opinions regarding labor unions generally.

2. Justify or even extol the company's wage policies or any other company practices.

3. Answer any or all arguments or charges that have been made by the union.

4. Advise employees that membership in the union is not a requirement for continued or future employment with the company.

5. Discuss union dues and the checkoff system with employees.

6. Discuss critically any union tactics or results of elections in other plants.

7. Express the desire to deal with employees individually and personally.

8. Point out to employees its belief that it is to their benefit to vote against the union, also that it is the wish and desire of the company that they do so.

9. Recount the history, background, and character of labor unions or their adherents.

10. Advise employees regarding their rights under the Act.

"Astute timing of your tactics prior to the union vote can vitally influence the result."

"As for No. 9," cautioned Ole, "I urge you to make very sure of your facts first. And on No. 10, I might add that you aren't obligated to inform employees about all their rights.

"Anyway, you can sum it up that management certainly doesn't have to remain neutral. And that's about it for the ground rules. I'd like to add, though, that whatever else you may say to your employees prior to an election, be certain to make a big pitch in assuring them that balloting will be secret and particularly that everyone should vote."

"Well, I've surely learned a lot," Bert assured them all. Then he addressed Ole: "There are, however, quite a few odds and ends not clear to me yet, and I'd very much like you to button them up."

"I'm not surprised," Ole sympathized, "that some angles still seem hazy to you. Remember, this subject is far from being simple. It's my guess that reports and findings of NLRB and the courts will fill volumes before it's clarified—if ever."

"At our last meeting," persisted Bert, "you said something about preelection statements to employees proving very helpful 'if properly timed.' Well, that '*properly timed*' business is one thing I'd like you to go into."

"There are," explained Ole, "certain election regulations set up by NLRB. One such ruling is that an employer may not call specific employees into any managerial office—that is, individually or in small groups—for pre-election talks. This the board considers intimidation—and thus grounds, if proven, for setting aside an election.

"Another rule prohibits both employers and unions from making election speeches on company time to mass assemblies of employees within 24 hr. before the election. This, if proved, also comprises grounds for setting aside an election.

"The 24-hr. rule doesn't, however, prohibit campaigning by literature, private conversation, or any means other than speeches. And as for speeches it just specifies those at which attendance may be held to be compulsory. In short, it doesn't prohibit talks where attendance of the employees is strictly on a voluntary basis and on their own time.

"You see, Bert, I'm now getting to your answer," Ole pointed out. "From what I've just said, you can understand that *timing* can be strategic and even vital. It's something like getting there 'fustest with the mostest" or, better stated, 'winning the last battle to win a war.' The strategic split second may determine the results of an election.

"And this brings me to caution you: Don't let the union frustrate you or stampede you into any desperate or unwise action. The union might like to drive you into some premature move that would show your hand and thus give them an advantage. This, and the other reasons mentioned, is what I meant by the importance of timing."

Smiling broadly, Bert closed his notebook and got to his feet.

"Before we break up," he announced, "I want all you Guff & Gripers to know how deeply indebted I am to you for the help and advice I've had.

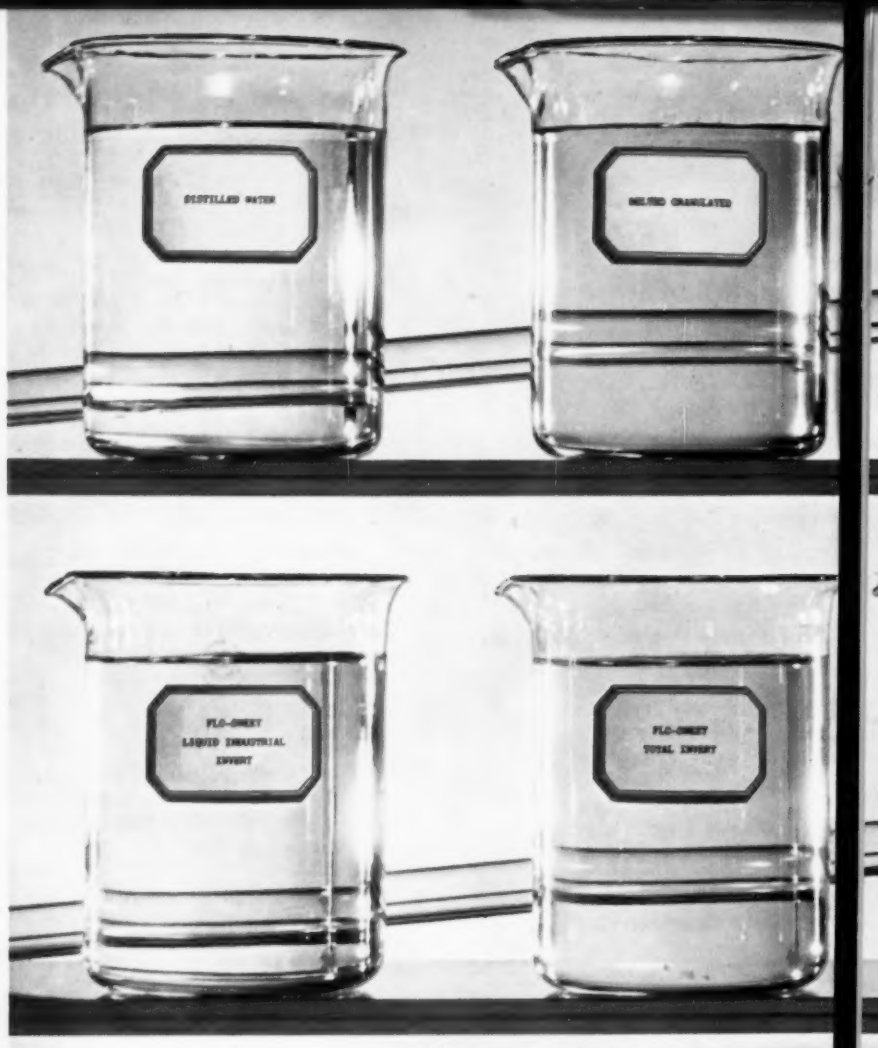
"As one result," he went on, "I've realized how much my company needs continual counsel and guidance—especially right now when we're in our formative years of growing and expanding. So today, just before this meeting, Barnastian Bros. made arrangements to retain Ole—and thus have a more legitimate claim to his advice."

This brought Ole a round of congratulations and well wishing. Then the members thanked Bert for his excellent hospitality.

"Much appreciate your coming," said Bert. "And I just hope it will be Okay for me to attend future G&G get togethers."

"Our door's always open to you!" spoke up Milt Sorenson as all the rest nodded. "And that's official!"

This color illustration is reproduced from an unretouched 8 x 10 Ektachrome original. The sample of melted granulated shows the color produced by a mixture of *three* commercial granulated sugars. To accentuate the colors for printing purposes, all samples were photographed in 1000-milliliter beakers; an idea of this size can be obtained from the typing on the labels. Below, a precision nephelometer is used to maintain frequent laboratory checks on Flo-Sweet's consistently lower turbidity – a further measure of refinery efficiency and liquid sugar quality.



IT'S CLEAR TO SEE...

See for yourself! This unretouched photograph reproduces the colors of the eight principal types of Flo-Sweet as precisely as possible with modern printing techniques.

Compare, if you will, Flo-Sweet liquid sucrose with distilled water. Hard to tell them apart, isn't it? Here's sugar quality you can *see!*

Note particularly the melted granulated, shown at the same concentration of sugar solids as the liquid sucrose. Compare it closely with Flo-Sweet industrial sucrose, industrial invert, total invert. Industrial types of Flo-Sweet show less color than granulated, the accepted standard of purity!

REFINED SYRUPS

YONKERS,

SERVING INDUSTRIAL SUGAR USERS EXCLUSIVELY

FLO-SWEET *Quality* IN EVERY DROP!

In Flo-Sweet amber and golden sugars, the colors—and characteristic flavors—are deliberate, and closely controlled. Note the clarity and freedom from haze.

The color of a liquid sugar is, of course, only one indication of its quality. We welcome comparison of Flo-Sweet with any other sugar—liquid or granulated . . . on any basis whatsoever: color, taste, aroma, laboratory analysis . . . or the practical test of how it performs in your own food products. You will discover what many Flo-Sweet users know through long experience: that Flo-Sweet has established exacting new standards of liquid sugar quality!

& SUGARS, INC.

NEW YORK

FROM YONKERS • ALLENTOWN • DETROIT • TOLEDO

FLO-SWEET

FIRST IN LIQUID SUGAR

AN EFFECTIVE WAY TO DEVELOP VALUABLE GOOD WILL FOR YOUR COMPANY

. . . and help to do a life-saving job at the same time

You can achieve lasting good will for your company—the kind of good will that results in friendly relations with every group in your community. And you can help to save precious lives at the same time, by putting your company's efforts behind the nation-wide campaign against traffic deaths.

During 1956, the national total of highway deaths was over 40,000—the highest figure in our history. The cost to the country of these wasted lives is incalculable.

But the picture wasn't entirely black. In many areas—in small towns and big cities—the terrible upward trend was reversed.

This was accomplished by community action—by business leaders, civic organizations, church, fraternal and PTA groups joining together with law enforcement agencies in an all-out attack on traffic deaths.

The figures prove it. Wherever people get together to do something about traffic safety, *deaths go down.*

BACK THE ATTACK ON TRAFFIC ACCIDENTS!

Your company can perform an invaluable service for your community, and for the country as a whole, by pitching in and helping in this life-saving crusade. For full information on what you can do — and how you can do it—write The National Safety Council, Chicago 11, Illinois.

Published in cooperation with
The National Safety Council
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NOW! LOW COST
MODULATING CONTROL
FOR TEMPERATURES UP TO 600° F

ANOTHER NEW IDEA FROM FULTON SYLPHON

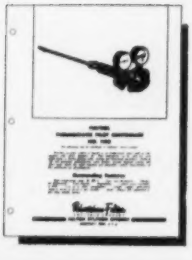
New FULTROL Thermostatic Pilot Controller No. 1100-C & D

Here is another example of how Fulton Sylphon gives you the best temperature control for your process at the lowest possible cost. This time it's an all-new FULTROL Thermostatic Pilot Controller—a simple, compact unit that now enables you to control temperatures up to 600° F. with *proportional* accuracy, but at *on-off* cost.

All that FULTROL needs is an air or other supply at a constant pressure anywhere between 18 and 40 psi. From then on, FULTROL strait-jackets temperature by modulating the output pressure to a final control valve, damper, or other device. FULTROL does all this by means of a simple, stainless steel thermal element. There are absolutely no troublesome pivots or levers.

What's more, you get all these extra features in the bargain:

- Instant knob adjustment of control setting over any 200° range specified between —50° F. and 600° F.
- Easily adjustable proportional band from 5° to 25° F.
- Protection against over-run temperatures (100° above range limit)
- Resistance to pressures up to 300 psi.



SEND TODAY FOR CATALOG SHEET NO. 10-28CG

Mr. Controls

Robertshaw-Fulton CONTROLS COMPANY

FULTON SYLPHON DIVISION • Knoxville 1, Tenn.

TEMPERATURE REGULATOR HEADQUARTERS, U. S. A.

For more data, circle this page number on card at back →

How LINK-BELT'S complete screw conveyor service

saves you time
spares you details

Here's a single, all-inclusive source for standard or special requirements

This four-point program provides quick and easy answers to any screw conveyor problem. Link-Belt offers you the widest range of component types and sizes. For example, you choose from 17 basic screw designs—in any suitable metal to meet temperature, corrosion, sanitation, abrasion and other requirements . . . in a full range of diameters, gauges and pitches. Whatever you need in components . . . and to whatever extent you require engineering counsel — Link-Belt will devise a system "tailored" to your specific needs. Ask your nearby Link-Belt office or authorized stock-carrying distributor for 92-page Data Book 2289.

◀ **SCREW CONVEYORS** are readily adaptable to inclined (left), horizontal or vertical handling of bulk materials.

1. **ANALYSIS AND ENGINEERING** service is provided by a district sales office in your area. Link-Belt district engineers can quickly ascertain the best conveying arrangement for your specific application.

2. **COMPLETE LINE OF SCREW CONVEYOR COMPONENTS** and related elevating, conveying and power transmission equipment is your assurance that specific needs will be fulfilled most efficiently and economically.

3. **EASY ERECTION** is achieved because of prefitting, match marking, close-tolerance manufacturing and layout drawings. Link-Belt will handle entire erection assignment if you wish.

4. **SATISFACTORY PERFORMANCE** is assured when you rely on Link-Belt as a single-contract source for your complete system. We will accept full responsibility for placing it in operating readiness for you.

LINK-BELT

SCREW CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,286

LINK-BELT'S COMPLETE LINE OF INTEGRATED COMPONENTS INCLUDES:

SCREWS · HANGERS · TROUGHS · SPOUTS & GATES · SHAFTS & COUPLINGS · TROUGH ENDS · DRIVES

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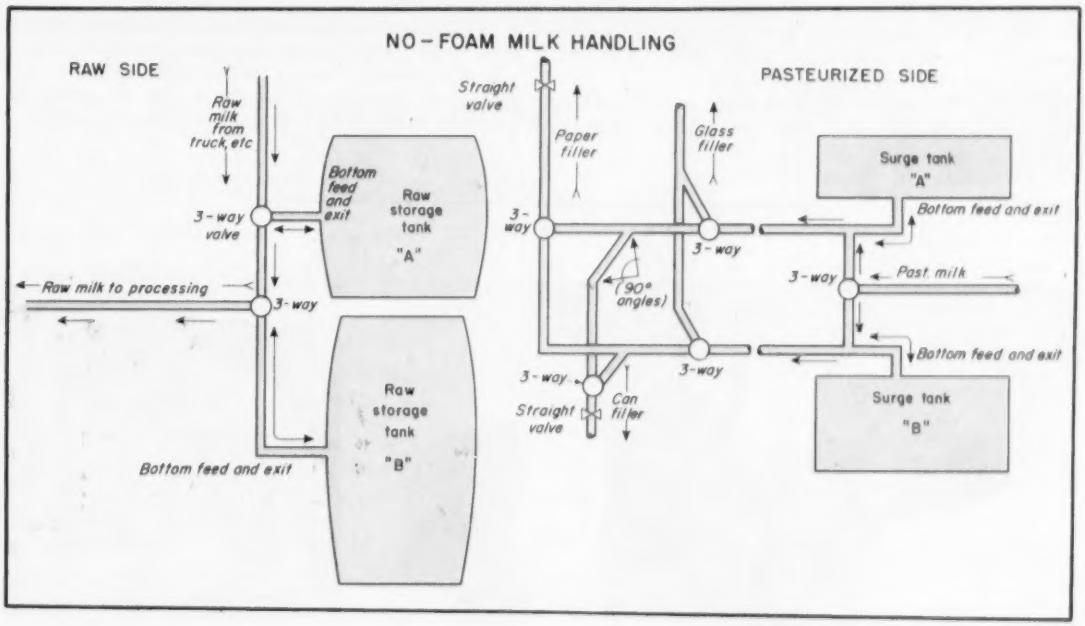
CUT OUT AND FILE

PRACTICAL IDEAS



Easy Way to End Milk Foaming

Frequent cause of milk off-flavors, especially in warm weather, is foam on the milk held in storage tanks. This is more frequent in unrefrigerated and coil-cooled tanks than with cold-wall insulated units.

In our plant we believed this foam was due entirely to top filling, and therefore employed this remedy:

All feed lines were ripped out, leaving only the exit line to the processing room. This line (sketch) was then altered to allow access to raw receipts, almost 100% of which are received via tank truck.

After hooking the pipe to the tank cup, opening the poppet valve at the tank bottom, and turning on the sanitary centrifugal pump, milk is forced into the storage tank at a highly satisfactory rate. The 3-way valve between the tanks allows milk to go directly to the pasteurizer, to the tanks alone, or to both pasteurizer and tanks simultaneously.

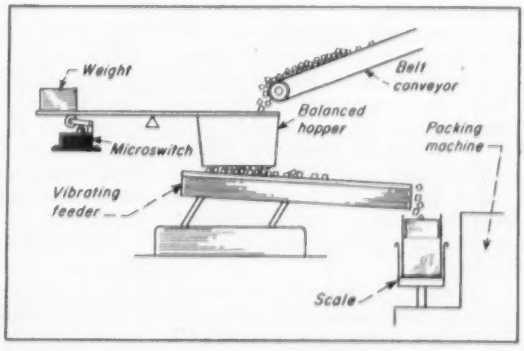
With the 3-way valve set in the proper manner, just the amount of milk required is admitted to the HTST pasteurizer. The balance goes to storage to await use.

Primary advantage of this arrangement is that there is no foam whatsoever to get warm on top of the milk and thus cause poor flavor. Second advantage is that the need for pipeline in this section is cut by almost 50%, and what remains is far more acceptable for creaming.

Instead of the centrifugal pump having a constant maximum head against which to labor, the head starts at virtually nothing when the storage tank is emptied and seldom builds up to the former maximum. A 3-way valve in the line causes little head interference.

In addition to producing foam, milk pouring into storage tanks from top feeding line has a tendency to incorporate small amounts of air, which sometimes result in short fills. This is especially true when only a small amount of milk is in the storage tanks and when filler and pasteurizer are working at the same rate.

But our method of bottom feed has eliminated this problem, giving us assurance against slack fill.—*Kligerman Dairies, Inc., Atlantic City, N. J.*



Fill-by-Weight Control

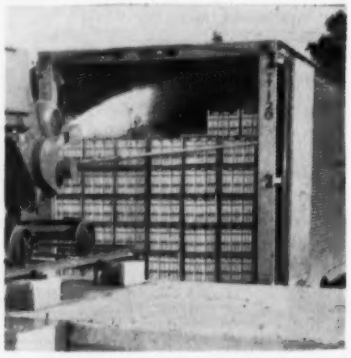
To insure accurate weight of cubed sugar in each package, we employ 2 Microswitches, Type BZE2RQ2, to regulate the two separate feed mechanisms.

One of the switches regulates the flow of cubes from

a belt conveyor to a hopper (see sketch). The unit is attached to a pivoted arm, and counterbalanced so that when filled the hopper lifts the counterbalance from the operating arm of the Microswitch. This interrupts the circuit of the conveyor motor and thus stops the feed. As the hopper empties it trips up. The counterweight is then lowered to close the switch, start the conveyor, and thus renew hopper filling.

The other Microswitch is incorporated in our package filling machine to control the operation of the vibrating feeder. As the carton positioned on the scale of the machine is filled to weight, the scale trips and thus actuates the Microswitch. This stops the vibration of the feeder, and interrupts the flow of cubes to the package.

When the machine brings the next carton onto the scale to be filled, the Microswitch is released to again start the vibrating feeder, and keeps it operative until the carton is filled.—*Bruce H. Foster, Engineer, St. Lawrence Sugar Refineries Ltd., Montreal, Quebec.*



9:20 A.M.—Slinging Starts

9:30—Job Completed

Cuts Icing-job Man-Hours 90%

Icing-down cases of bottled or cartoned milk in 30-ft. trailers is no longer a problem at Dean Milk Co., Rochester, Ind.

It's now done speedily and efficiently with a mechanical ice slinger —a modified snow-blower developed with the cooperation of W. M. Sprinkman Corp., Milwaukee, and R. O. Gettelman, Pewaukee, Wis.

With this unit, two men ice a trailer in a mere 10 min., or one man does it in 25 min. In contrast, the old manual chore took two men about 2 hr.

In addition, the ice coverage is now uniform over the load, and there's less damage to cartoned milk —as often suffered with hand-shoveled ice. In a half-minute, the thrower sends 200 lb. of flake ice a distance of 60 ft. The high-velocity ejection gives the necessary horizontal stream to send the ice through the clearance between tops of cases and trailer ceiling. The slinger is mounted on a 4-wheel carriage that travels on narrow-gage rails.

From 5-ton triple bins (Vilter Mfg. Co.), flake ice is shoveled (or it can be introduced mechanically) into the 200-lb.-capacity hopper of the ice slinger. Then, after being track-rolled the short distance to the end of the loading dock, the unit distributes ice into the waiting trailer (each 30-ft. carrier takes about 1,200 lb. of ice).

Once unit is positioned, the operation proceeds in three stages:

1. A motor (½ hp.) starts driving a 1½x5-ft. flight conveyor (on 8-in. centers) on the bottom of the hopper. carrying flake ice to the first feeder.

2. Four horizontal, intermittent, screw-type feeder blades (they're 14x20 in. and set concentric with the feeder housing) next rotate at 100 rpm. to prepare flake ice for the high-velocity discharge.

3. Two similar blades (5x14 in.) turning at 1,725 rpm., send the snow-ice through an 8x8x40-in., swinging-type metal spout. Bottom of the latter is completely open to prevent ice freeze-up. Motor drive on the blade rotors is 7½ hp.

Guarding Hammermill Tips

Carbide hammermill tips have been found to be unsatisfactory when hard, foreign material is encountered. A single piece of such material may

SERVING INDUSTRY WITH "COLLOIDS OUT OF THE SEA"

SeaKem EXTRACTS

An ADVERTISEMENT by and about SEAPLANT CHEMICAL CORPORATION of New Bedford, Mass.

THE OPEN MIND

A Way to Increased Sales

We've talked before about what can happen to someone who is willing to try some of the new ideas we attempt to peddle on these pages. Here's a case in point.

A while back, a big producer of orange juice concentrates thought he could increase his sales by getting children to consume his healthful product in ways other than as a breakfast juice. Specifically, he thought in terms of frozen pops to be made at home from fresh concentrated orange juice. His problem, of course, was one of stability and our lab went to work on it. Eventually, this work got us interested in so-called synthetic frozen pops, i.e., those made from artificial flavors and colored with food-grade aniline colors.

Among other things we learned was that a side effect of the SeaKem Stabilizer is prevention of color migration in ordinary frozen pops containing aniline dyes.

Just about every father knows this phenomenon. Young Tommy buys a frozen pop from the man with the happy disposition and jingling truck. Then, after the July sun and young Tommy's lusty slurps have gone to work, what happens? The pop on the stick becomes as anemic looking in spots as one of Jack Benny's highballs. Why? Because the color migrates and leaves the "ice" first. Result is a pop that is part clear ice and part colored.

By way of contrast, a particular SeaKem Stabilizer in any frozen pop will hold the color in perfect distribution during melting, with no migration from the first drip to the last.

"See? Always keep an open mind on SeaKem Stabilizer."

This result was discovered more or less by accident. We were trying to stabilize the pop, not the color, but in doing so discovered the highly beneficial effect on the color.

In order to sleep nights every good chemist has to have explanations for such results. So here is the "why," developed after the fact, for whatever interest it will hold:

SeaKem Stabilizers are negatively charged polymers (the strongest naturally occurring anionic polymers, says our lab). The food-grade aniline dyes are positively charged. So, the SeaKem Stabilizer and the dyes just naturally get together (like magnet and nail or boy and girl). The particular SeaKem Stabilizer used is a water gel former, so it forms a gel matrix which is uniformly distributed throughout the pop. And there's your color, 100% uniform and bound up so it can't migrate upon melting.

That, dear friends, is the scientific explanation. But as the layman sez, "Results is!" So, if you have a similar problem of color or some other material migrating, and you think there is a ghost of a chance that Our Product can help, maybe a 3¢ stamp on a letter to us at New Bedford could pay off.

Competition for Coconuts?

Hawaiian natives are said to use over 70 species of seaweed as food. Natives of other Pacific Islands utilize large amounts of seaweed and, in some instances, algae is the principal vegetable portion of their diets. In the U.S. some seaweed is washed, dried and eaten as a delicacy.

Quickies

- The items on these pages are from recent issues of our house organ, published under this same SeaKem EXTRACTS masthead . . . regular issues also included technical discussions pertinent to colloidal problems . . . To be put on mailing list, just check the coupon on page 2.
- Known more familiarly as Irish Moss Extractives, nature has provided an abundance of the source material from which SeaKem "Colloids Out of the Sea" are derived—and years of experience have proved the usefulness of these red sea plants in gelling, thickening, emollient and demulcent applications. . . . However, real growth had to wait until modern technology could unscramble the intricacies of producing—on a tonnage basis—uniform, tailor-made extractives derived from an incredibly complex source material . . . Today, SeaKem Stabilizers are contributing important advantages to more than a hundred different food products ranging from chocolate milk and ice cream to salad dressings and frosting mixes.
- A more complete presentation of Our Story is available in an 8-page brochure entitled "Colloids Out of the Sea" . . . yours for the asking by checking the coupon on page 2.

Products in Glass Houses

One of the things we always love to discuss is the low cost of *our* product *vis-a-vis* the high value of appearance and salability to *your* product.

Everybody knows about the strong trend to self-service merchandising in recent years—and about the wisdom of helping a product to sell itself through displays, attractive labeling and packing in glass containers. Packaging so the product can be seen has become of tremendous merchandising importance. But some manufacturers miss the boat altogether by spending large sums on promotion, label and glass

CONTINUED

CUT AND FILE

containers, only to find that after a few weeks or months on the grocer's shelf the appearance of the product not only will guarantee "no sale" but will give the manufacturer a bad name as well. Solid materials settle to the bottom and liquid rises to the top. Color from the solids may leach out into the liquid phase giving an unattractive discoloration to the liquid. Spices and other wholesome materials appear as ugly sediment at the bottom of the jar. These are just a few of the contingencies that can guarantee such a product's failure.

On the usage side, there are drawbacks, too. Nearly everyone has had the experience of approaching the relish tray at a hot dog stand only to find little more than water in the dish. Solid and liquid have separated so that the first 15 customers got too much solid with no liquid and the last five got only liquid. The same relish with SeaKem Stabilizer would have helped assure each customer a homogeneous product with all of the taste and other qualities that the producer intended, in each portion. Not only that, but the product goes farther. Sometimes a producer finds he can actually improve his product by adding more water or fewer spices or similar ingredients. By so doing, he more than offsets the small cost of the stabilizer.

What we're trying to say is this. If you pack your product in a glass container (or if you plan to do so) and there is any danger of unsightliness due to separation of ingredients, settling, discoloration, or what have you, we'll bet that we can prove the sales soundness of adding a SeaKem Stabilizer to your formulation.

Milk Products Our Specialty

We like to think that milk puddings and milk base pie fillings are to us what "shortnin' bread" is to "Mammy's li'l chillun." And, of course, we've got as fine a formulation as ever topped off a noble repast. For when it comes to milk products, SeaKem Stabilizers are *ne plus ultra,* whatever that means.

SeaKem Type 10 does the neatest job on these products. It gives them:

1. *Unexcelled spooning qualities.*
2. *A creamy, perfect "melt-in-the-mouth" consistency when eaten.*
3. *An excellent sheen.*
4. *Reduction of surface skin.*

Complete technical details are available. Ask for Bulletin 260. If especially interested in Instant Puddings perhaps we can help there too.

Stretching the Agar

Here, we hope, is some good news for our friends in Bakery Supply Houses. After a good deal of research, we've found that a newly developed low-viscosity, high gel strength product (SeaKem Type 14), can be used as an agar extender in some formulations of cake icings. The trick is in achieving high gelling power and exceedingly low viscosity in Type 14—something we've never been able to do before.

Our tests at New Bedford indicate that SeaKem Type 14 Stabilizer can replace up to 50% of agar used in cake icing formulations.

There is just one drawback, though, and we hope to lick that some day. Some of the desirable gloss that agar imparts to finished icings is lost with replacement, hence the suggestion of using SeaKem Type 14 as a 50:50 extender, which leaves enough agar to maintain normal gloss. If you have any ideas on this one, or would like some samples of SeaKem Type 14 for your own laboratory work, we'll be glad to hear from you.

Sweet Potato Gels

Want in on the ground floor of a potentially profitable potato product? Sweet potato gels are a big deal south of the border and several authorities think that they could be here too, if handled right. The trick seems to be in adding just the right spices in a just Jake gel.

Adjusting the physical properties of the product is no problem thanks to the Moss named for the Irish.

did you know?

. . . that SeaKem "Colloids Out of the Sea" are uniquely different both in their reactivity with proteins and their ability to work well "in combination" with other colloidal materials.

. . . that because of their reactivity with milk in any form, soya and egg proteins, very small amounts of a SeaKem Stabilizer often will react with, and thus bring into more effective play, naturally-present ingredients, making possible formulation accomplishments and production economies users call "incredible".

. . . that SeaKem Stabilizers can be used as "tool" ingredients "in combination" with other colloidal materials (starches, locust bean gum, carboxymethylcellulose, etc.) to build behavior and advantages which cannot be obtained from any one of these ingredients alone.

SEAPLANT CHEMICAL CORPORATION

63 David St., New Bedford, Mass.

Gentlemen:

Please send me more information on the following items: _____

_____

Please send me your "Colloids Out of the Sea" brochure ☐

Please put me on your SeaKem EXTRACTS mailing lists ☐

Please send me information on the following special application: _____

_____

Your Name: _____
(please print)

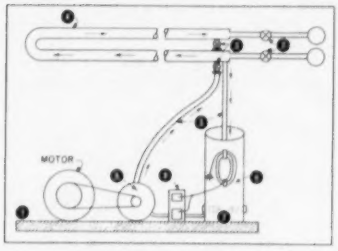
Firm Name: _____

Address: _____

City and State: _____

actually cause dislodgement of all tips when encountered.

With material free of hard, foreign particles, the performance is most satisfactory and increases hammer-life 20 times normal.—*Technical Bulletin, General Foods Corp.*



Portable Coil Defroster

Coils that carry calcium chloride brine can be quickly and efficiently defrosted with this simply made unit.

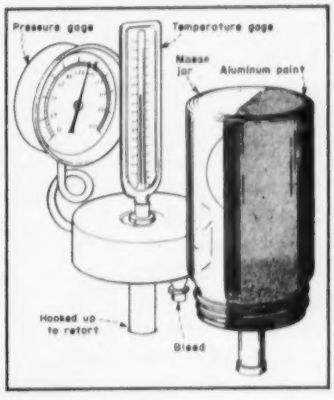
Mounted on a base—(1) in sketch—the assembly is set on a truck for easy transporting. For the most part, materials readily available in the plant can be used in its construction.

To operate the defroster, first close the valves (2), which control the flow of low-temperature brine to and from the coils. Then connect to valves (3)—which are attached to coils (4)—the 50-ft. length of ½-in. hose (5). Latter feeds brine from a coil into a 20-gal. galvanized heating tank (6) and then returns the warm solution, via hose, to melt the frost on the refrigerated coil.

The two electric heating units (7) that warm the brine have a capacity of 220v., 6,000w. each. And the ¾-in. pump (8), which circulates the brine, is driven by a ¼-hp. 220v. motor. Both heater and motor are controlled by separate switches mounted on panel (9) connected by one lead to an electric outlet.

When coils are frost free, the circulating pump is stopped, coil valves (3) are closed, and refrigeration valves (2) are opened. The hose is then disconnected.

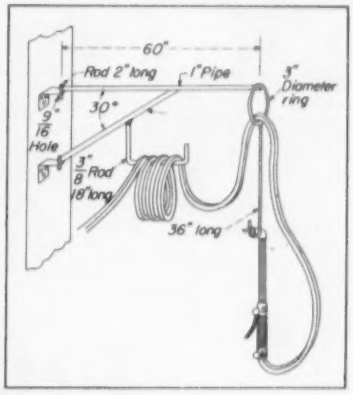
This type portable unit permits defrosting of one coil at a time. Furthermore, it doesn't affect the temperature in the storage room. We might add that its cost (judging by our own experience in building the unit) comes under $400.—*Gerard Bourret, Superintendent, Cold Storage Plant, Rimouski, Quebec.*



Light Bulbs Safeguarded

Accidental breakage of bulbs that provided light to read retort pressure and temperature instruments was excessive at Owen Canning Corp., Owen, Wis. But breakage was decidedly reduced when Mason jars were placed over the bulbs.

In addition, visibility for instrument reading was improved and glare was cut down by painting half of each bulb-covering jar with aluminum paint.—*FE Staff*



For Welding Torch Hose Safe Keeping, Long Life

When blow-pipe hose is left lying on the floor not only does it create an accident hazard, but it also will deteriorate rapidly. One satisfactory way to keep the hose off the floor is to provide a simply constructed boom on which to coil the hose.

To make the boom, weld a piece of 1-in. (see sketch) and ¾-in. pipe together at an angle of 30 deg. Then, on the end of each pipe section, weld a 2-in. piece of ⅜ in. welding rod to fit into ⅞ in. holes drilled in two angle clips. These clips may be attached to the wall at a convenient height to serve as a means of pivoting the boom out of the way.

A bracket on which the hose may be coiled can be shaped from a length of ⅜ in. welding rod, 18 in. long, at-

CAN YOU USE $50?

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Send one of your ideas to FOOD ENGINEERING. Each month $50 is presented to someone like you for the best item in this department. And the chance that it will be you is now running about one in twelve.

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We'll do the finished writing and drawing for you. Send it today, before you forget. Address it to Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.—The Editors.

DECEMBER PRACTICAL IDEA WINNER was "Protecting Pipe Insulation," submitted by P. J. Morrissey, Security Warehouse & Cold Storage Co., San Jose, Calif.

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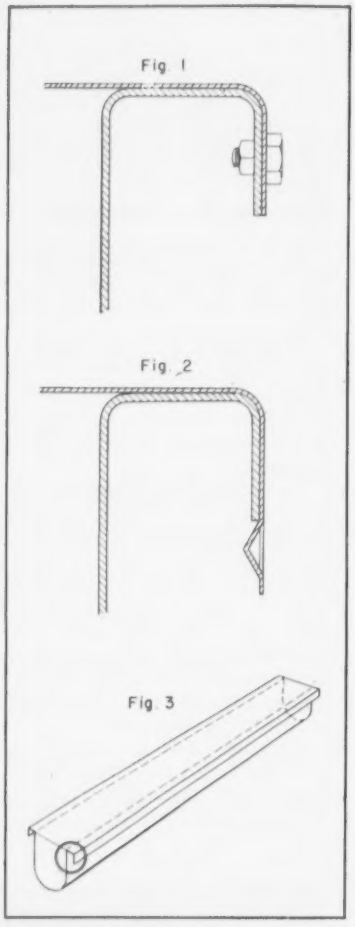
Practical Ideas

tached to and suspended from the ¾ in. brace pipe.

Now to the end of the 1 in. pipe weld, in a suspended position, a ¾ in. ring also made from welding rod. From the bottom of this ring a welded hook for the torch is suspended. It is also made from welding rod.

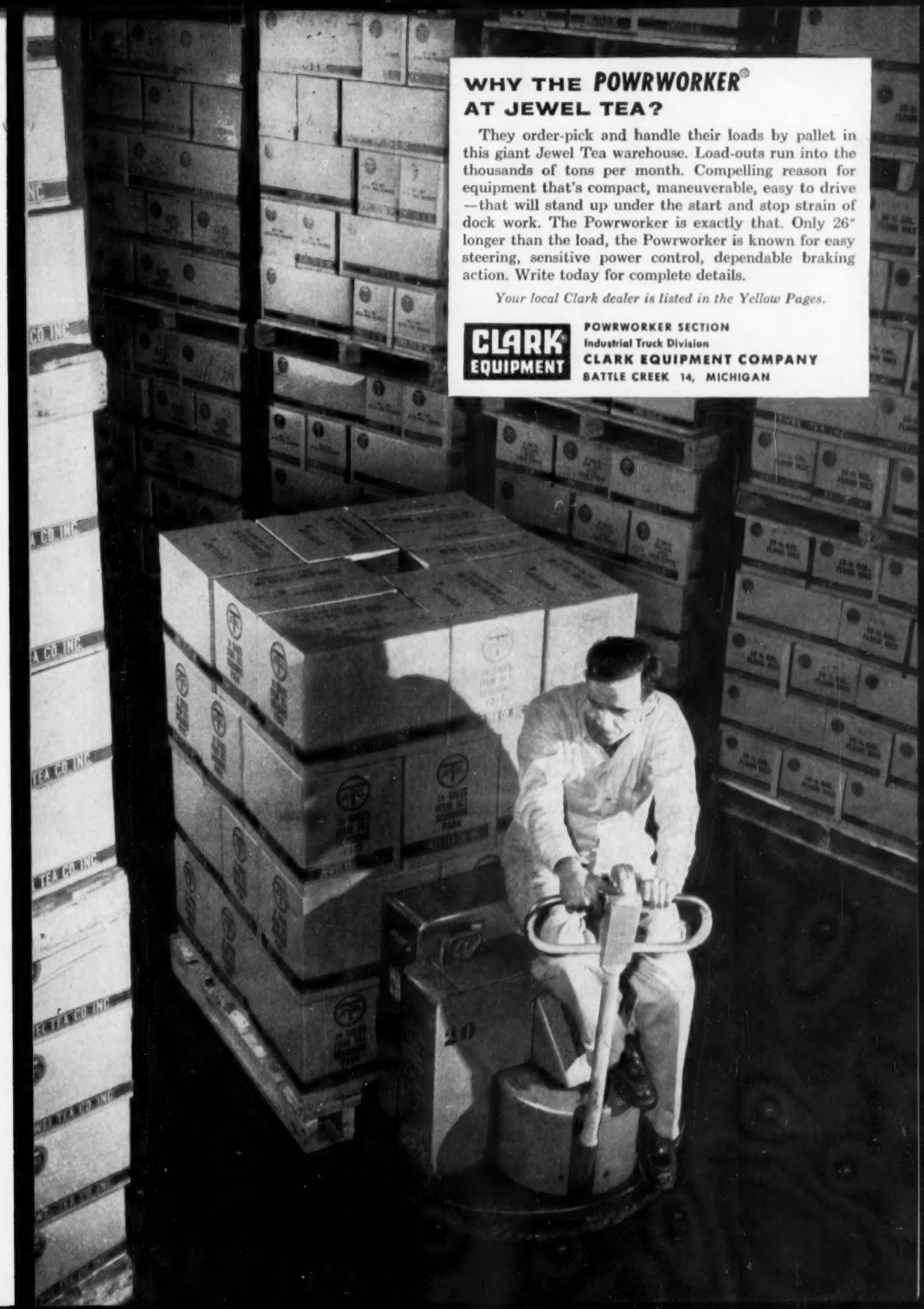
This assembly always makes the torch accessible, yet keeps the hose safely out of the way.—*Linde Tips, Linde Air Products Co., New York, N. Y.*



Simplified Cover Fastening For Worm Conveyors

We needed conveyor covers that could be seated tightly yet be easy to remove.

Our old ones, shown in Fig. 1, were fastened by spaced screws. If the cover was to be removed, requisite tools had to be available—but in practice they rarely were.



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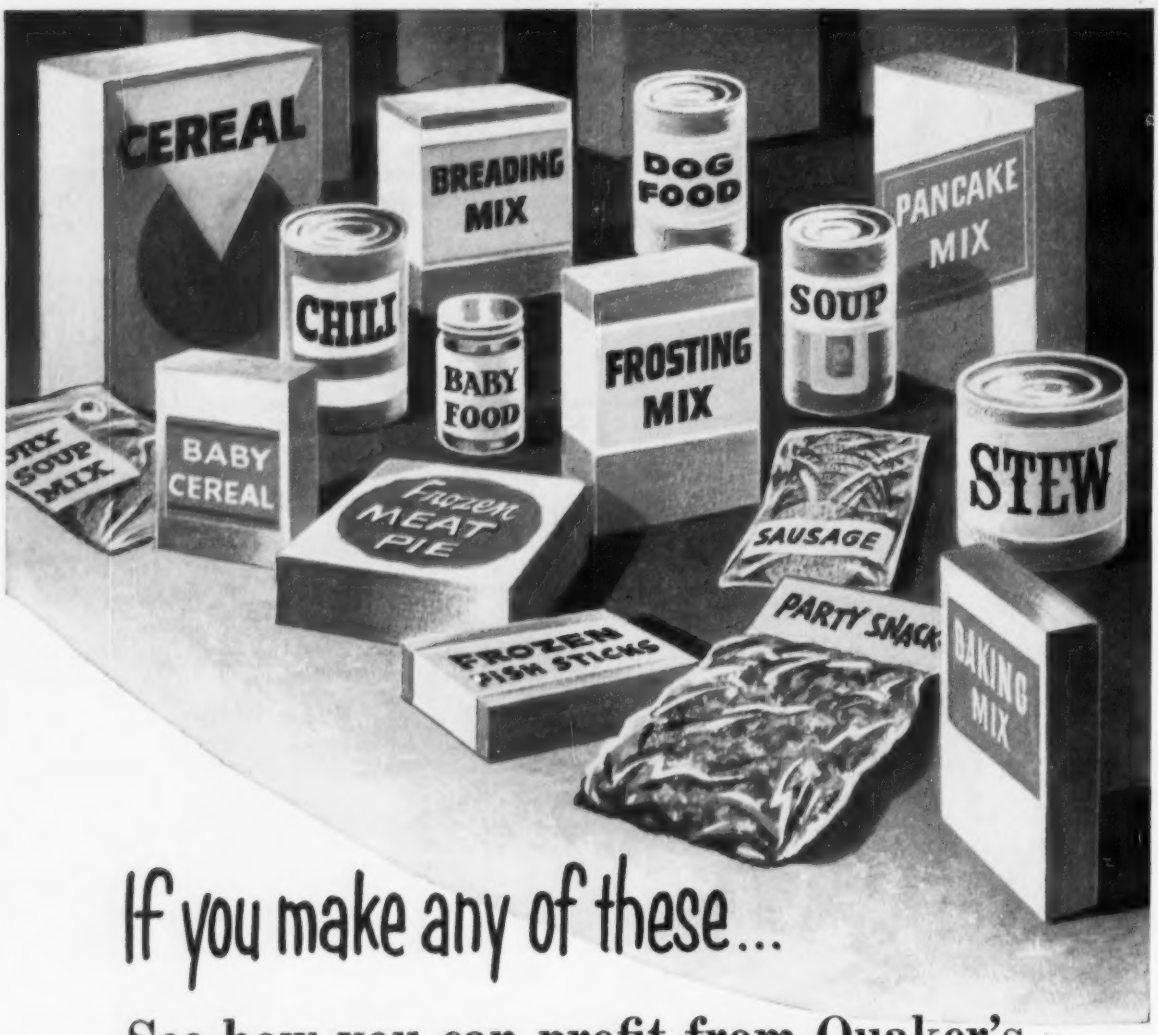

If you make any of these...

See how you can profit from Quaker's processing experience and facilities!

Whatever your product's specifications, give them to Quaker. We can meet a wide variety of specifications and we may save you time and money as well.

Here's how! Quaker, through its tremendous resources, offers a wide variety of grains. You can have any size granulation—from original grain to microscopic size. And these products have almost *unlimited* application in food processing. For example. Quaker's oats, corn, barley and rice are extremely neutral. Used as thickeners or carriers they may assume, accent or eliminate certain characteristics of other ingredients.

Quaker's continual quality control assures uniform high quality products. This eliminates costly and time consuming rejects. And Quaker can often offer freight savings by combining orders in mixed car shipments. Its mills, located throughout the country, assure you of quick service and more favorable freight rates. And Quaker is equipped to handle bulk, too—another saving for you.

Chances are there's a Quaker product or processing development that can help make *your* product better or at a lower cost. Contact the Industrial Sales Department, The Quaker Oats Company, Merchandise Mart, Chicago 54, Illinois.

QUAKER

THE QUAKER OATS COMPANY
CHICAGO 54, ILLINOIS

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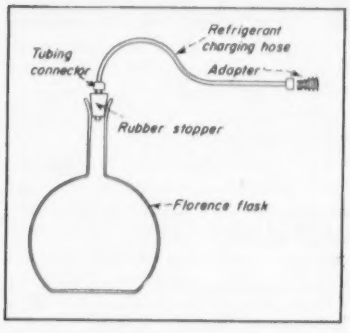
Upon refastening, due to loss of screws, lack of time, or just plain neglect, the cover was often improperly attached and mounted.

In order to avoid this problem a better fastening method was required and a few experiments yielded the arrangement shown in Fig. 2.

The cover is extended along the entire length of its down-flanged sides so that these sides are longer than the flanged sides of the conveyor trough (Fig. 3). Die-stamped recesses are provided at certain points.

To mount the cover, it is put in place and then pushed into final position—the flanged sides and the cover permit a natural spring effect along their entire width. Then the recesses are beneath the flanged edge of the conveyor trough. The shape of the recesses is such that the cover may be removed easily and quickly without the use of tools, and all the disadvantages of the old cover have been eliminated.—*B. Martin, Engineer, Drachten, Holland.*



Simplifies Brix Tests

Making Brix hydrometer tests on our carbonated beverages is faster and more efficient now that we have developed a new method of removing carbonation.

All we needed for our new equipment (see sketch) was a 1,000 ml. Florence flask, a rubber stopper, a tubing connector, and a ¼-in. male pipe thread x ¼-in. male flare tubing thread adapter.

We drilled a hole in the rubber stopper so that the tubing connector could be screwed into it. The charging hose was fitted to the tubing connector, and the other end fastened to our deaerator by means of the adapter.

For testing, we pour the sample

Faced with a Cooling Problem?

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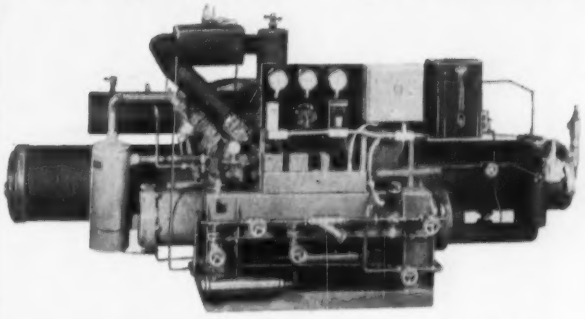
SYRUP COOLING
TOMATO JUICE
VEGETABLE OIL
WINE



FOR YOUR *unusual* COOLING REQUIREMENTS

Employing the flooded refrigeration principle, the coolers which are of special multipass design may be used effectively for handling viscous or slurry type liquids. The package includes a complete refrigeration cycle, completely assembled and tested, ready for quick installation and immediate operation. These units are available in a range of sizes from 5 to 100 H.P.

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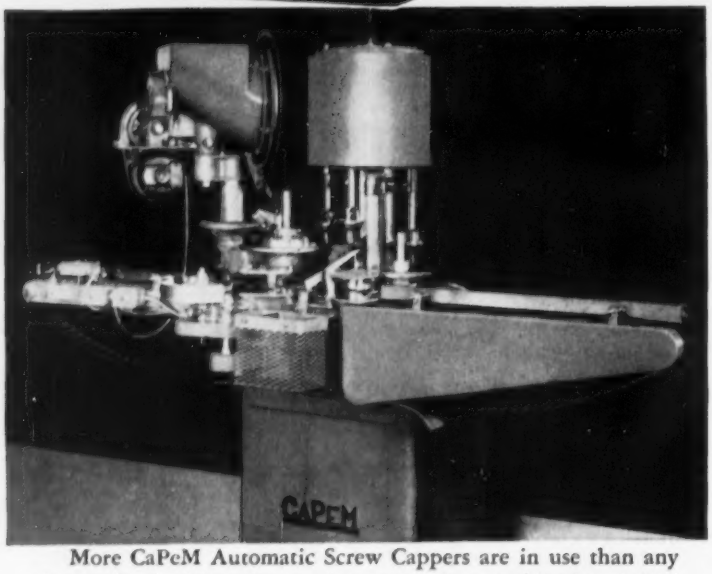
IF PACKAGING COSTS ARE
SKYROCKETING
CAPEM SCREW CAPPERS
WILL BRING THEM
DOWN



More CaPeM Automatic Screw Cappers are in use than any other make. And for very good reasons. They combine low initial cost, low operating cost and a minimum of maintenance expense.

MEET EVERY PACKAGING REQUIREMENT

Eight standard CaPeM models accommodate a broad range of standard sizes and shapes of both containers and caps, as well as a wide variety of flexible molded closures of the CT type, both in combination with polyethylene squeeze bottles and otherwise.

In addition, advanced types of CaPeM machines are adapted for sorting, feeding and applying Wheaton and similar type closures, Kimble-type polyethylene plugs, polyethylene fitments, corks, etc., and in combination with a wide variety of secondary closures.

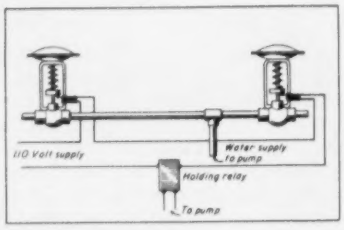
CaPeM is fully automatic . . . delivers a uniformly dependable seal . . . handles bottles, cans, jars and jugs from 2 ozs. to gallons . . . applies all types of metal and plastic screw caps . . . is easily synchronized with all standard types of related equipment.

Write for specifications and the name of your nearest Consolidated representative. You'll find his broad experience with all types of packaging problems helpful.

CONSOLIDATED PACKAGING MACHINERY CORP.
1400 West Ave., Buffalo 13, N.Y.

Practical Ideas

into the flask, insert the rubber stopper, and open a valve at the deaerator. The vacuum created flashes the carbonation from our beverage in less than a minute. Not only are time and effort saved by this method, but the carbonation is more efficiently removed.—*A. J. Morgan, Jr., Norfolk Coca Cola Bottling Works, Inc., Norfolk, Va.*



Control System Operates Two Lines

On each of two processing lines water is supplied to a Desuper-heater by a pump remote from the operating area. To adequately protect the equipment, we installed controls to allow the pump to continue in operation while either line was in use, and stop it whenever both lines were discontinued.

We made the hookup in the following manner:

When the lines are in operation both heaters are supplied with water and steam. We therefore installed a Microswitch (see sketch) on the temperature controller which operates the 1-in. water valve regulating the supply of water to each heater. This installation was so located on the valve yoke that the microswitch is actuated whenever the water valve is closed.

Then the two micro controls were wired in line to a holding relay which operates the water pump.

When both processes are shut down the steam temperature drops below the control point. Then both water valves will close. This operates the microswitch which in turn causes the holding relay to interrupt the circuit to the water pump motor. However, if only one line is in operation, the relay is inoperative, and the pump continues to supply water to the active line. No one is required to pay attention to the operation of the pump.—*Larry Fredenburg, Instrument Engineer, Post Cereals Div., General Foods, Inc., Battle Creek, Mich.*

Store-Pak peanuts packed for Food Fair Stores, Inc., Philadelphia, Pa. Film of ALATHON extruded by H & R Industries, Nazareth, Pa. Converted by Boyertown Packaging Company, Boyertown, Pa.

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Foods retain their freshness and flavor when packaged in tough, transparent film of ALATHON polyethylene resin. Du Pont ALATHON provides both superior protection and attractiveness for a wide variety of products. These Store-Pak peanuts, packaged in film of ALATHON, reach the consumer just as fresh and tasty as they were when they went into the package.

Film of ALATHON is odorless, tasteless and nontoxic. It combines outstanding strength and durability with an unusually high degree of transparency. Though resistant to solvents, film of ALATHON can be attractively and permanently printed.

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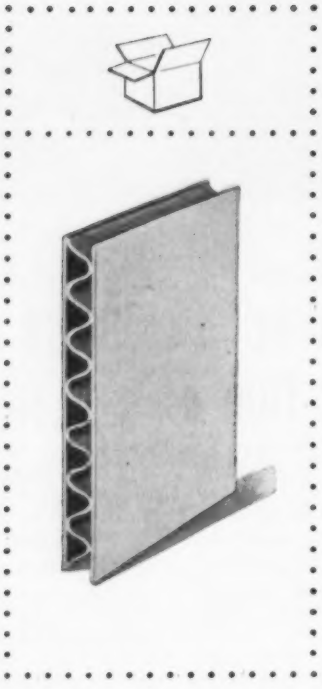
what you
should know
about
FLUTES
in
Union Boxes

Why do they put "permanent waves"



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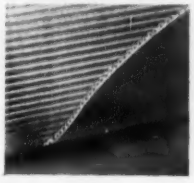
in corrugated boxes?

The small "waves," or flutes, in the center section of corrugated board are a vital box construction feature. Like bridge trusses, they absorb and distribute shock — provide extra rigidity for the walls of your shipping container.

Flutes are like bridge trusses

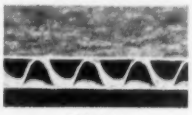
All flutes, as the illustrations show, are not alike. No one is "best." Each does a specific job. Selecting the type you should be using calls for a detailed analysis of your product. This is one small part of Union's complete package engineering service. These fundamentals, however, are excellent guideposts:



The corrugator forms the flutes

An "A" for cushioning

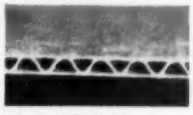
"A" flutes were the first type used in corrugated box manufacture. They have the highest arches—about 3/16 inch. "A" flutes are generally used for fragile articles because their added height offers extra cushioning and better stacking strength.



"A" flutes

"B" flutes–smallest and stiffest

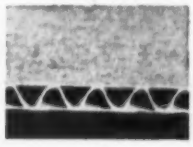
"B" flutes are lower, stiffer than "A," have 42 per cent more flutes per foot. Because of reduced thickness, "B" flute board makes a neater package, takes up less warehouse and car space. Excellent for heavy items like canned goods which support their own weight, thus require less shock resistance.



"B" flutes

"C"—the in-between flute

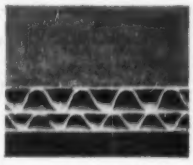
Half-way and happy medium between "A" and "B" are "C" flutes, probably the most commonly used today. They combine the best features of the other two and are often an excellent compromise.



"C" flutes

Combinations may be needed

Flutes may also be combined, one on top of the other, to form a double wall container. The combinations most generally used are "A"-"B" and "C"-"B." The double walls provide greater protection and cushioning, and are ideal for heavy duty containers.



"B"-"C" flutes

Union Box engineers are always ready to help you determine the proper flute, or combination. You'll find, too, that the flutes in Union Boxes are consistently well formed—each of uniform height—each taking its full share of the load.

This sturdy construction is one of your best assurances of dependable performance of your corrugated shipping container.

union camp

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NEW STANDARDS
OF PERFORMANCE...
Another
LUNKENHEIMER
FIRST!
THE
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VALVE
FIG. LQ600-200
200 lb. S.P.—400 lb. W.O.G.
550° F.
FIG. LQ600-150
150 lb. S.P.—300 lb. W.O.G.
¼ to 2 inches
Thousands of these valves have served for as long as five years without replacement, regrinding, maintenance, or leakage—even on the most severe services. Their patented Brinalloy* seats and discs are more resistant to wear and corrosion than 500 Brinell Stainless Steel . . . even outlast case-hardened Stainless Steel exceeding 1000 Brinell. LQ600 Valves practically eliminate maintenance costs!
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Freezers Must Heed Warnings to Clean House

Fast sales gains have been chalked up by frozen foods—500 percent in 10 years. But this boom has created serious problems that threaten to retard progress and to invite government interference.

Achievements and problems were spelled out at the National Frozen Foods Convention last month. So freezers and distributors are aware of the situation.

It boils down to a need for each firm and each management man to insist upon producing, maintaining, and selling quality products—and to refrain from engaging in unsound, unfair, and unprofitable practices.

There is no doubt of the urgency. There is no mystery as to what needs to be done—or not done. But whether all management men involved will have the gumption to follow through remains to be seen.

Reminder of black year 1946

It will not be easy. Enticing short-run gains often will have to be sacrificed for long-pull benefits. This means that the men will be separated from the boys in 1957, much as they were in the black year of 1946.

A couple of parallels with conditions in 1946 were cited by NAFFP's retiring president, F. Gilbert Lamb: (1) There is an exceptionally large pack of most frozen foods—one which might not be consumed before the next pack is on the market. (2) There is a national tight-money policy which might make it distressing for many to finance another large pack.

Couple with these the fact that it is costly in money and quality to store frozen foods long. Then toss in the current tendency to sell on the basis of price instead of quality and convenience. And you have the makings of a business storm.

But there is no need for serious trouble. Only 50 percent of the market for frozen foods now uses those products regularly. And the regular-user market is by no means saturated.

Must sell quality and convenience

Fortunately, there are more than 20 million families with medium and high incomes—families that can quite easily buy more than the $2 billion outlay for frozen foods in 1956. And they will if freezers, distributors, and retailers cooperate to give them good reasons in quality and convenience.

All the distribution tricks against which the Federal Trade Commission complains—price discrimination, phony advertising allowances, free carloads, and what have you—will not build long-term business. Nor will they yield satisfactory profits.

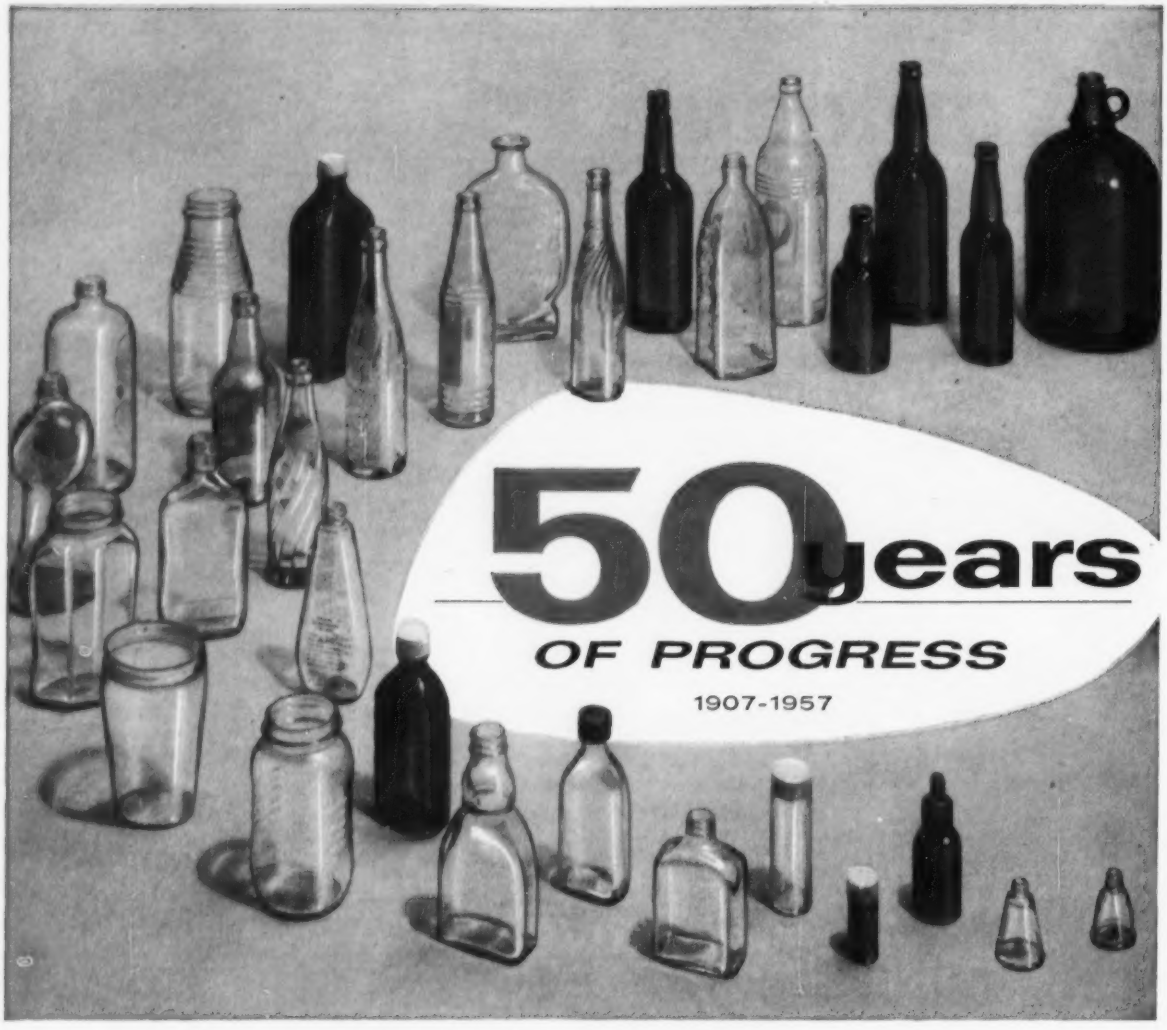
Instead, they will strew wreckage across the path of a fast-growing phase of the food industry.

Yes, freezing is at another critical point in its exciting history. And as in every such instance in the past, only plus-values at the consumers' tables will see it safely on its way.

Fortunately, new tests have been discovered which make it possible to check the quality of several frozen products at the various steps along the storage and distribution route (page 125).

Application of these to spot product abuse, and to correct it, can do much to keep consumers eating increasing quantities of frozen foods.

And freezers should remember black 1946.



in the manufacture of quality glass containers

From very humble beginnings fifty years ago, Brockway Glass Company has progressed continuously until today it is not only one of the leaders in its field, but actually, a very fast growing name in the Glass Container Industry.

There has been a continuing increase in the demand for glass for packaging . . . and Brockway has more than kept pace with this demand. This is exemplified by the opening of its modern new plant at Freehold, N. J., August 1956, less than a year after its acquisition of the Demuth Glass Works at Parkersburg, West Virginia.

This represents the fifth major glass container manufacturing plant serving Brockway's many valued customers and each plant is strategically located to provide the very ultimate in service in its particular area.

We pledge the continuation of the high quality standards and service which have enabled us to reach our present position, and to strive for even greater efficiency and service in the future.

BROCKWAY GLASS
COMPANY, INC.

BROCKWAY, PENNSYLVANIA
Sales Offices in Principal Cities
Subsidiary:
Demuth Glass Works, Inc., Parkersburg, W. Va.

Plants: BROCKWAY, PA. • CRENSHAW, PA. • FREEHOLD, N. J. • LAPEL, IND. • MUSKOGEE, OKLA.

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A food technologist answers his old professor:

"Why I Joined the Union"

• Every incident in the case recounted here is true to the last detail —just as it was related (naturally anonymously) to Food Engineering's Ivan C. Miller.

"Technologist Charley," you will find, is decidedly surgical in his revelations. Also, you may think certain of his "pills" rather "bitter to take."

But, as "Charley" tells his old mentor at the close of the letter, such trouble can be averted. And he points out how.

Professor———————

Dean of Scientific & Engineering Schools
University of———————

Dear Professor:

Yes, I was very surprised to hear from you after all these years.

But I really wasn't surprised at your many questions relative to the "evil rumors" about me that have reached your ears.

I can picture your eyebrows rising: *Charley, your old honor student, and long-time member of the ACS and IFT, joining a union!* You must have felt I'd let everyone down.

True, it must have confused you. Hadn't I been one of your own boys who'd invested years in academic studies, as well as a sizable bankroll, in order to merit claim to a profession? Yes, and now, after more than 20 years, I'd finally thrown in my lot with the workers in my plant.

Correct! I *do* belong to the same union as the 700 or so laborers here —though our small lab group functions under a separate contract.

As for your other questions, I'll now tackle them as honestly as I can. However, I warn you, some of my answers will present paradoxes. And certain ones will seem incompatible and even contradictory.

Starting with the one concerning my work and "status" before I joined the union, I'll admit that I do not consider myself as having measured up fully to my abilities and to the quality of the training you and your teaching staff gave me. I hope later, here, to provide ample reasons if not justification.

Now, my next statement may seem inconsistent—for in spite of what I have just said about not measuring up, I am quite proud of my accomplishments during the 25 years since you handed me my sheepskin.

Here are some of the reasons: For many years at this plant, I've been nominal head of the lab. Even though I have no title that would indicate any authority, my position is one of major responsibility.

At the time I joined the union, my duties required me to make many important decisions regarding manufacturing quality and also to make final decisions on many costly purchases.

In fact, in addition to normal duties, I've worked on assignment for almost seven years researching a question that many other scientists have been struggling to solve for half a century.

Well, I actually was on the threshold of a solution. In fact, I personally considered the problem solved. So I was merely striving for method refinements and ways to perfect all steps of the procedure.

But then the company suddenly said, "Drop it!"

Why? Well, it was because of the division manager (whose title also includes that of division laboratory manager). You see, when he was asked by Headquarters where the project stood, he reported, "No progress."

As far as he knew, he was honest. During all the years of this project, he never once asked about the results.

For that matter, never once during the seven years did our Headquarters VP—the one in charge of all lab activities—inquire about the program, even though he was the one who assigned it originally. Apparently, he promptly forgot it.

In fact, during this period no one

" 'Drop it!', was the sudden order."

asked me what I was doing. The decision to end this long and productive effort was made by two men who weren't conscious of, nor actually interested in, the project and its results.

That was only one of numerous situations that frustrated me since I started with the firm more than 20 years ago. And my experience doesn't differ much from that of other members of our lab group.

Just one more thing on my work: Though company records may reveal very little to my credit, I hold that my efforts and their results, during the many years, have been

". . . Mine was for 50¢!"

above average; also better, I'll venture, than the average of those in food laboratories in general.

In your letter you expressed astonishment that a group like the one here—academically trained and intelligent—should turn to a labor union for help, rather than to company management. But a few aspects should provide sufficient reasons:

Back when the "gods were favorable," a few of us annually received a salary raise amounting to $2 per week. Now on one occasion during that period I considered that the work I was doing and the responsibility I carried merited a salary increase well above that "regular."

Furthermore, when I discussed my views and hopes with the plant boss he readily agreed that my work warranted a sizable increase. And I have reason to believe that on this occasion he made such a recommendation to Headquarters.

Incidentally, I'd like to point out that my company has always made large profits as compared to other companies.

Anyway, when the raises came through that particular year, most were for the old "$2 regular." But mine was for 50¢. And my thought was, "How cheap can they get?"

Yes, in time we all learned better than to ask for a raise. We learned other lessons, too—among them that we couldn't, without fear of retribution, go to management executives higher than our own immediate superior and openly discuss matters. And I mean any matter—whether it be a raise in pay or anything else pertaining to an individual, or questions of the group such as circumstances affecting job or company relations.

If a man was foolish enough to make a request or suggestion to management, company attitude was almost sure to follow the "policy groove."

To my definite knowledge, a Headquarters assistant manager once answered, "We do not want any unhappy employees in our organization." Then he followed up this *gentle hint* by saying, "You are always free to leave. We wouldn't stop you from trying to find a place *where you will be happy.*"

Now, as for "telling it to our immediate superior," we soon realized that if he did act in our behalf, he, too, was then on the spot. So you might say all roads were blocked.

You now know, Professor, some of the seeds of discontent planted through the years—seeds very ready to sprout. Here are just a few more:

With the exception of two minor concessions, during these years, management in no way indicated it looked upon our group as anything but *plant labor*—certainly we weren't in any way considered a part of management, either line or staff. However, we did share a locker room with foremen, possibly only because it was conveniently near the lab.

And true, though we punched a time clock just like plant labor, we were paid *salaries*—*not* wages. However, at the time we joined the union, the *salaries* of the people who'd served as long as seven years in our lab were less than the wages of newly-hired sweepers—the lowest paid plant laborers.

This was a tough one to swallow.

Through the years some of us did aspire to a role in management—line

"We wouldn't stop you . . ."

or staff. And I'm confident that the abilities of some of us would have contributed very much.

Looking at it from our slant—any first-line management job would have been a sweet plum for us. At least it would have been from the standpoint of income and opportunity to move up in the company.

But almost any plant laborer always had a far better chance to enter management than we did. Almost invariably, line management was drawn from the union membership. Staff openings were generally filled from the outside.

Usually, the first that our lab group ever heard of management vacancies, or new management openings, was after they were filled.

And so we joined the union—but not, however, in the orderly way you presumed. There was no long period of discrete discussion—no thorough consideration. It still seems that "it just happened." The overall time was less than three weeks.

It came about after one of our seven-year members learned for sure that his pay was less than the wage of sweepers hired the week before. That lit the fuse to the powder keg.

Now to some more of your questions about me and my reactions before and after joining. It's understandable that I was the last to learn of the group's intent to unionize. The rest knew I'd worked for the company the longest, and they were very doubtful as to what my attitude would be.

Here are pros and cons I weighed:

If I joined, I'd certainly face, along with the others, segregation within the organization. However, I realized the shift in that direction could only be one of slight degree. For there wasn't much further to go. True, as a member of a union, I could expect to be "frozen into my present position," dependent on the union alone for advancement. But then, what advancement had I had in 20-odd years?

There was one other major hurdle: I'd lose "professional status". But since I had virtually no status within the *organization,* it was only status on the outside at stake.

I admit that in addition to the other cons, there were also many qualms. I'll comment on a few of these later. So, now for points on the pro side: With an opportunity for advancement to management "out the window" for me, the union seemed to offer the only way to maximum earnings in this plant.

Then, too, there was security. Way back, at the time of the 50¢-a-week raise episode, I realized there was no such thing as security for any one in our group. The union, however, would guarantee me top seniority—and with it, security—even, ironically, through periods where the level of quality and out-

put of my work might drop down.

Still another distinct asset was the opportunity unionization assured us to say what we think—to talk freely, and safely.

So, as I say, I weighed the pros against the cons and joined the union—and that made the choice of our group unanimous. There were, for me, however, a few other heavily influencing factors:

If all in our group but me joined the union, the situation would have

"That lit the fuse!"

been untenable. A divided house must fall—and I was sure to be the first to tumble.

You see, all plant employees belong to the union—a new employee is allowed 30 days to join, or else. Furthermore, on request the union supplies workers to fill company needs, and the company checks off union dues.

Your question, "Did you *have* to join the union?", I answer readily:

Of course not. It's still a free country. I was not compelled to join the union any more than I am compelled to work for any particular organization. But nevertheless, I'm quite certain that if I hadn't joined the union, I wouldn't be employed by this company today.

And how has management reacted? That's one of the paradoxes I mentioned earlier.

For 22 years, as I've said, all evidence indicated that management considered our group practically the same as its 700 or so production workers. Other than the fact that along with them we were a part of the cost of doing business, it seemed we didn't even exist.

And *consideration* of us? Well, regardless of tenure, we rated less, at least as individuals, than plant employees just past their first month.

It's different now. At least management *knows* we exist. Also, management now realizes we're not like mill workers. It seems very strange that we're now accorded a new "status" with "rights."

Today, we have "power," and because of it we're respected (or feared). Formerly, we were not recognized for our academic background, for the scientific values we brought to our industry, or for our day-in-and-day-out intellectual endeavors in developing both improved and new products and production methods, and which assured the quality of all products and thus maintained the market's respect for the company's valued name.

I'm convinced management now greatly regrets that its scientific and technical personnel belongs to a union—and not entirely because of the appreciable gains the union has bargained out for us. Management seems to have realized *too late* that we are now on the wrong side of the fence.

And here, by the way, are a few of the gains that have accrued to us—all in the contract, too: Our jobs (no longer positions) are secure, and mine most of all since I enjoy greatest seniority. No longer can we be discharged—except for just cause positively established. No longer are any of us given that line, "If you aren't happy here . . ."

For many of us our incomes have increased more in the last three years than during the previous decade—our paychecks being adjusted to levels more nearly equitable with those of the other personnel.

For example, this year it wasn't the old $2 a week raise. Instead, all of us were raised more than $5 a week. In addition, some were granted appreciable "income adjustments."

In view of the old prospects for advancement, consider the irony of this, Professor: Our contract specifically reads that, should opportunities for advancement arise, consideration shall be given to qualified individuals within our unionized laboratory group. Union representatives must now be given a hearing to discuss—that is, bargain—with management regarding the claim of any of us when an opportunity for advancement arises. Now, at last, we know in *advance* about openings.

As I say, management is now aware of our "power," if not our worth. And the following little incident, the first after we unionized, made both management and us surprisingly aware of that "force".

You'll recall my saying we always shared a locker room with foremen. But as soon as we joined the union, management informed us we'd have to move out of there. It figured we didn't belong where management (the foremen) might be discussing confidential information.

To be sure, we weren't management before we unionized and certainly aren't now. Nevertheless, management has failed to realize to what an extent we've already shared much of the company's confidential information—the knowledge of product formulas, ingredients, standards and sources, processing procedures, costs—and even some other valuable information we ourselves originated.

Now then, if union members are unworthy of confidences, how can we be trusted with all the particular company "secrets" that instigate research, along with the results therefrom. Anyhow since we definitely do share at least some of the confidential information, shouldn't we be included, in some way, in management's ranks?

A few months earlier, the slightest whim of management could have moved us out of that locker room, like so many pawns. But now the union stepped in. Upshot: Management could move the *foremen* anywhere it chose. But moving us out of the locker room might be considered "unfair labor practice"—a punishment for joining the union.

We still use that locker room.

You've probably concluded I have only contempt for my company. But that isn't true. From the beginning, I've considered that my company is one of the best. It's highly respected by the suppliers, has integrity in maintaining top quality, treats customers fairly.

A management's callousness in relations with its scientific personnel is regrettable, and may prove costly

"Today we have 'power'!"

and even tragic. But that's not sufficient grounds, it seems to me, for condemning the company.

Now, Professor, I come to your question as to how it all looks today. Well, at the time I joined the union, I fully expected the morale of the group to disintegrate to the attitude, "Get all you can get, and do as little as possible." I was wrong. Oh, yes, a few are like that, but they don't dare drag their heels often or obviously.

The group as a whole has consistently and willingly produced up to or above pre-union level. Morale,

I must admit, is higher than it was. For as I've said, in our group there are only a few of the "take all and give nothing" belligerents. Instead, the sane ones dominate.

I've tried to be objective and impartial here in listing the gains the union has garnered for our group and for me. As I've indicated, they are far from inconsequential. *But nevertheless, I regret it was necessary for me to become a member of a labor union, and that's no secret.*

To both management, and later to union members gathered at a general meeting, I said:

"I'm sorry it was necessary for me, and for our group, to join a labor union in order to obtain recognition, reasonable assurance of security within the company, and to reach a just and equitable compensation level.

"It should not have to be this way with well-educated, capable scientific personnel—each man a specialist, a professional. As such, each man is quite difficult to replace, certainly far more so than a plant laborer who can be drawn from the union's pool.

"Scientific personnel should be recognized as such both inside and outside the organization."

No one, to my knowledge, has yet contested that statement.

Now, back to me and my reactions: As a member of the union, I've been sincere, I assure you, in my efforts to fully earn my income,

"The curriculum ought to be broadened."

and to be fair to my company and loyal. But I have to admit, it's not the same now. Something has been added, and also something is missing.

During the three years since we organized, there has been a subtle, though not abrupt, change—a growing recognition of our power through union support. But for some of us at least, there has come with it the realization that our gains and our advancements are *not our own accomplishments*. For we know that policies, and any considerations concerning us, are usually established by the union and the company.

In short, we are a commodity which the union sells to the company—as suppliers sell ingredients, equipment, and raws—at a profit to the seller. We are a commodity the company now must buy and does so on the best terms it can obtain.

Of course, not all company managements are as remiss as ours has been. Of that I'm sure. Nevertheless, how I wish there were some way to alert the management of every food company—particularly the management at the very top—to make them realize that it is *vital* for those who run the business to be *closer* to their scientific, engineering, and technical personnel as individuals. And of course I mean *before* they organize.

If management were sufficiently vigilant on this score there should then be no need for a union.

Re your last query: No, I haven't held any office in my union, nor tried for one. In this respect, I have neglected a duty. Because I should have. For I believe strongly that there is real need in unions for a viewpoint not influenced by a labor background or union associations.

So when it is possible, I intend to meet this obligation. You see, Professor, during the years I've devoted time and energy to civic activities—and these have, to an extent, compensated for the frustrations of my job.

Of course, I cannot run out on these commitments. However, as I am relieved of them I plan to plunge into union activities, seek office, and give the organization my best.

Finally, some reverse English.

I am more grateful for your letter, Professor, than you will ever know. It has given me the chance to unload the burden I have carried.

But there is still another load I'm anxious to get off my chest—and I hope to shift it to you. It concerns the responsibilities of the universities and colleges and their teaching staffs —their responsibilities to students of science and engineering, and also to industry.

To me, it seems that the future of the institutions of learning and those that staff them are at stake.

Let's suppose that when I finished high school I could have lifted the curtain and got a view of my next 30 years. Here are a few things I could have seen:

Instead of investing years in hard day and night academic study and enough money to have paid most, if not all of the cost of a small home—all this in order to learn a profession —I could have been *paid* almost as much as I spent, maybe more, by industry. I mean in learning a craft, trade, or skill. And then, through the aid of a union—and practically responsibility-free—I could have netted far more income through the years than I did. And, in addition to all this I would then have had real job security such as I never actually knew until the last three years.

Furthermore, I could have chosen this route and still found the road to a management post always open.

As it was, I paid in full the price for a "status" that turned out to be somewhat nebulous, and which I now feel I have surrendered.

Knowing all this 30 years ago, what do you suppose would have been my choice? And how different from mine would be the choice of those who will finish high school this year—that is, if they only could know all I now know?

From where, then, would come the student enrollment in engineering and scientific schools to help balance out the bigger and bigger academic budgets? And from where would come, or could come, the vastly increased numbers of science and engineering graduates urgently needed to meet the rapidly expanding demands of the years ahead?

It seems to me that here's a job for you and your contemporaries in the country's seats of learning. And here I visualize your aid along two routes:

Somehow, the already overloaded engineering and scientific curriculum ought to be broadened to include at least the fundamentals of business.

And in the same way that other expensive and valuable items are sold, the products of your ardent labor—the scientists and engineers—must be "sold" to industry, meaning particularly top management.

Here's a formula for that selling:

1. Establish definitely the quality and the worth of the product.

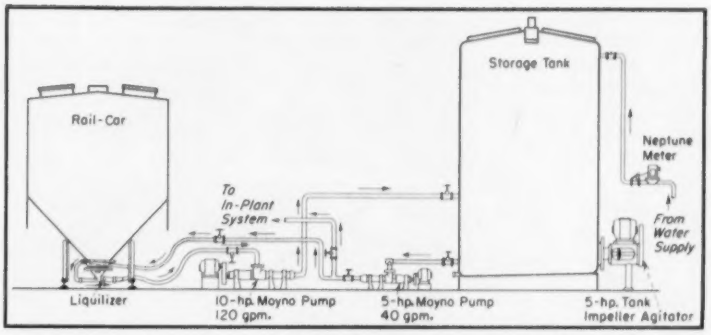
2. Thoroughly instruct industry how to use your product and how to obtain from it the greatest profit. Also, do not fail to point out the price that must be paid when there is abuse instead of profitable use.

3. Be sure to provide complete directions for adequate and necessary maintenance of your product.

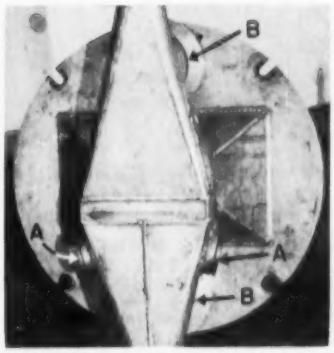
This, it seems to me, is now one more of your *prime* responsibilities. Carry on!

Your old student

Charley



SCHEMATIC of Liquilizer installation for converting granulated to liquid sugar. In operation, measured volume of water is metered into storage tank (right), then circulated through Liquilizer attached below hopper of rail-car (left), until car is emptied. Agitation of slurry in tank completes solution.



LIQUILIZER is made of aluminum, weighs 25 lb., is of 30-in. dia. It attaches to discharge port of covered rail-car with four I-bolts. Slight ports (A), on discharge side of unit enable visual observation, breathers (B) provide air to facilitate sugar flow.

Unit Makes Liquid Sugar Right in User's Plant

Bulk granulated sugar, received by rail-car or truck, is quickly and economically converted to proper specifications

RICHARD H. SYRING and C. R. HAVIGHORST
FE Correspondent, Portland, Ore., and Senior Associate Editor, San Francisco

TOP VIEW of unit. Water enters at (A) and jets across aperture (B) in hopper of unit. Sugar-water slurry is discharged at (C) and pumped to storage tank. Air vents (D) are covered by wire-mesh and fabric.

IT'S NOW FEASIBLE for any food plant using a minimum of 10,000 bags of granulated sugar annually to cash in on the advantages inherent in the liquid product.

This is accomplished by means of a new economical in-plant system developed by Amalgamated Sugar Co., Ogden, Utah. It easily converts bulk granulated sugar into liquid of desired gravity right at the user's plant. One of the first commercial installations is the John Graf Bottling Co., Milwaukee.

In doing this, the new system overcomes a previous big disadvantage of liquid sugar—cost of transporting water. For, freight on this portion (roughly ¼ of liquid sugar's weight) had limited economical delivery to approximately a 100-mile radius of the refinery.

An additional plus-feature is the low cost of fabricating and installing equipment comprising the new system—reckoned as approximately one-third that of conventional projects. And in plants previously using bagged sugar, an average saving of 15c./cwt. is typical.

Heart of the new system is the Liquilizer*—a converter in which bulk granulated sugar and water are mixed to form a slurry. It is bolted to discharge hopper of car or truck.

Granulated sugar flows into it and is picked up and mixed with water that is jetted across the discharge aperture. The slurry is picked up at such a rate that this water does not penetrate the sugar-dam.

The system also comprises a storage tank, a 2-in. pump that feeds water to the Liquilizer, a 3-in. pump that removes sugar-water slurry and discharges it to storage tank. Pumps are positive-displacement, abrasion-resistant types.

Operation Detailed

To convert a 100,000-lb. bulk-carload of granulated sugar into 66.5 deg. Brix liquid, 50,376 lb. of water (604 gal.) are metered into the storage tank. Liquilizer is bolted to discharge port of car and connected to the liquid system by the flexible hoses coupled with snap-on fittings. Pumps and tank agitator are then started.

After opening discharge gate of car, no attempt is made to regulate rate of flow of sugar. The Liquilizer is self-regulating and will accept sugar only at a fixed rate.

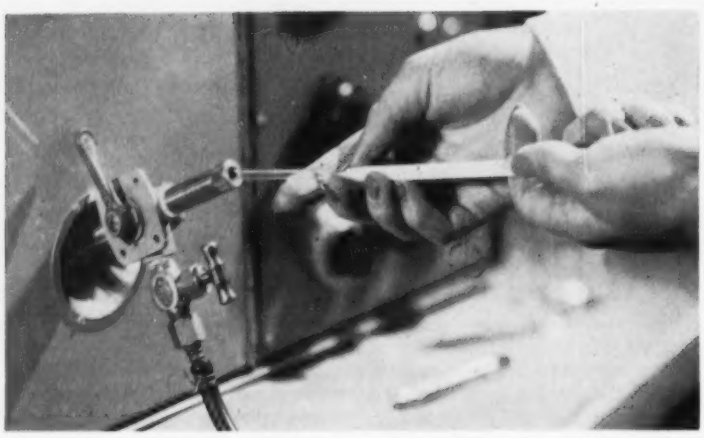
This self-regulating, proportioning, and blending is achieved by the unique design of the converter and by using a pump of fixed capacity (40 gpm.) as a liquid feed, along with one of larger capacity (120 gpm.) to remove the slurry.

Since water has been pre-measured to match total volume of sugar in the car, the circulation is continued until car is completely unloaded. Then pumps are stopped.

Agitation of mixture in the storage tank is continued for about 2 hr., or until all of the sugar is in solution. A total time of 5 hr. is required to unload a 140,000-lb. rail-car.

*Patent applied for.

Speedy and accurate, this new fractionating technique smooths the way to better, more uniform foods. And by taking complex analyses in stride, it's helping to solve baffling flavor (and off-flavor) problems in a variety of products



SAMPLE VALVE of gas-chromatography unit is charged with liquid to be analyzed. Note use of micro-pipette, which indicates how little material is required. Pipette and sample may be cooled when liquid is highly volatile, heated when viscous.

GAS CHROMATOGRAPHY

Versatile Analytical Tool For Quality Control, Research

I. S. FAGERSON

Associate Research Professor, Department of Food Technology, University of Massachusetts, Amherst

HERE'S A RAPID analytical technique that sharpens quality control and simplifies research with complex chemical systems, such as food flavors and odors.

Called gas chromatography, it permits easy separation of multi-component mixtures into fractions that can readily be identified and measured.

Separation depends upon differences in physical-chemical properties of individual components, and instruments now make this analysis automatic. Versatility is another plus-factor—for the method may be applied to any material that can be converted to the vapor phase at below 300 deg. C. (572F.).

Thus, gas chromatography offers a number of important advantages—

In Quality Control: Under certain conditions, a complete multi-component analysis, including calculation time, can be made in less than 20 min. Determination of a single component, such as N_2, O_2, or CO_2 in a gas-packed product, may be run in under 5 min.

In Research: This technique has been very successful in determining—

- **Relation of off-flavors and pesticide treatment of fruits and vegetables.**
- **Flavor and enzyme activity in vegetables.**
- **Effect of volatile compounds on shrimp quality.**
- **Odorous components of the strawberry.**
- **Off-flavors in irradiated meats.**

Also promising, though still speculative, are the following applications: Analyzing fats and oils for rancidity, checking volatile flavors (and off-flavors) in dairy products, detecting incipient spoilage in meats and fish, and studying permeability rates of odors through packaging materials.

Method Readily Checks—

- **Organic compounds (as alcohols, esters, aldehydes, ethers, amines, amides, and fatty acids**
- **Essential oils**
- **Metabolic products**
- **Gases (as H_2, O_2, N_2, and CO_2)**
- **Water in organic solvents**
- **Aromatic and chlorinated hydrocarbons**
- **Refrigerants**

Now, for a closer look at the method and equipment:

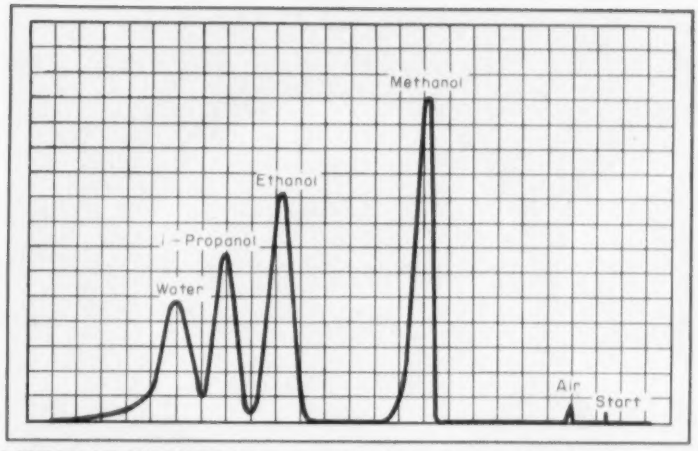
System in Action

A measured sample of gas or liquid is introduced into a stream of carrier gas (usually helium) through a heated sampling chamber (see flow schematic on next page).

The voltalized mixture, called the gas or mobile phase, is then swept into a column packed with the system's stationary phase. Latter consists of inert particles, such as Celite or kieselguhr, which have been coated with a high-boiling liquid (silicone oil or dioctylpthalate).

In passing through the column, sample's components are distributed between the two phases. Since their rate of travel depends on whether partition favors the mobile or the stationary phase, each component leaves the column at a different time. Thus, each is subsequently carried through a sensing device in its order of emergence.

As noted, the method is limited to substances with boiling points below 300C., which is the maximum operating temperature of presently available column materials. In addition, operation at higher tempera-



COURSE OF ANALYSIS is traced on strip chart. Position of peaks along abscissa (time axis) identifies separated components, while area under a specific peak is a measure of that item's concentration. Here, a mixture of methanol, ethanol, isopropanol, and water has been fractionated.

tures results in slower elution speeds and the possibility of thermal alteration of heat-labile items.

Therefore, gas chromatography cannot be applied to solids and higher-boiling liquids. However, this limitation is not absolute for many of these compounds can be converted to lower-boiling derivatives prior to analysis. For example, certain amino acids may be analyzed if they are first converted to their ninhydrin derivatives. And higher-boiling fatty acids may be handled as their methyl or ethyl esters.

Gaging the Components

The sensing device usually is a sensitive dual thermal-conductivity cell. Its reference side is exposed to the carrier gas, while the sensing side provides passage for carrier gas plus separated components. Both sides are incorporated into a balanced bridge circuit.

When a thermal-conductivity difference occurs between sides of the detector, as when a separated component is carried through, bridge unbalance produces a voltage that drives a standard strip-chart recorder. Result is a series of symmetrical peaks on the chart, each corresponding to one of the separated components.

Position of a peak along the chart's time axis is the qualitative value, while area under a peak is a measure of a component's concentration (see graph). Occasionally components may be incompletely separated, which causes overlapping of peaks. But this difficulty usually can be resolved by using another packing.

Here, it should be noted that choice of column material probably is the most important factor in this work. To achieve the desired separation, it is essential to use a material with specific selectivity for the various components.

In more difficult analyses it may be necessary to use several columns, but almost infinite resolution is attainable with proper packing materials. In research on food flavors, primary emphasis is placed on high separating efficiency. Compared with fractional distillation, gas chromatography permits efficiencies on the order of 1,000 theoretical plates.

In addition to low cost per analysis and simplicity of operation, this technique also permits recovering of separated fractions for further study.

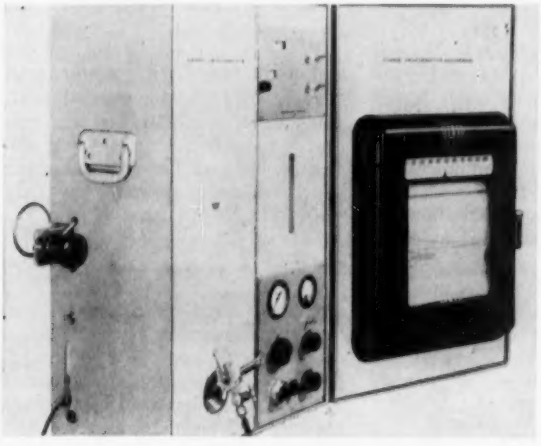
Instrument Data

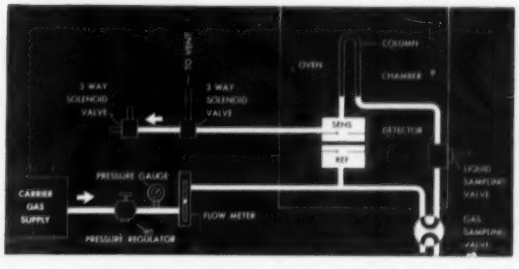
Techniques of gas chromatography have been embodied in instruments such as the one illustrated at the bottom of this page (Model 154-B Vapor Fractometer, Perkin-Elmer Corp., Norwalk, Conn.).

Its reproducibility is 0.25% for gases, 0.5% for low-boiling liquids, and 1.0% for high-boiling compounds. Sample volume required for multi-component mixtures ranges from 0.001 to 0.050 ml. for liquids, and 0.1 to 25 cc. for gases.

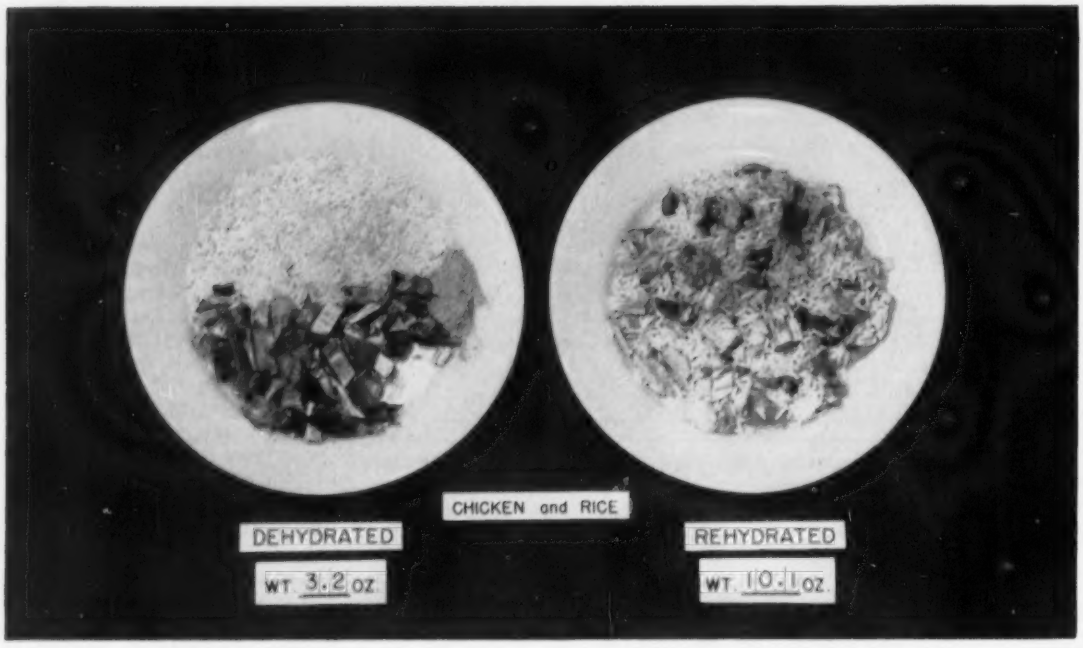
This article is based on the paper, "Gas Chromatography—A New Analytical Technique," authorized as Contribution No. 1092, Massachusetts Agricultural Experiment Station. Illustrations, courtesy Perkin-Elmer Corp., Norwalk, Conn.

Chromatography Unit and How It Operates





COMPACT INSTRUMENT (left) separates components according to rate of travel through column packed with inert material. Above: Schematic shows carrier gas (helium) flowing past reference side of detector (thermal-conductivity cell) prior to taking up vaporized sample. After traveling through packed column, gas and vapor enter sensing side of detector, then pass to atmosphere or collecting system.



NOTABLE WEIGHT SAVING of 6.9 oz. per serving is won with new dehydrated chicken-and-rice dish. Transported in light, convenient 3.2 oz. form (left), it then readily rehydrates, at point of actual eating, into full 10.1 oz. tasty meal (right).

Quick-Serve Meals for the Army

★ Why They're Needed ★ What They'll Comprise ★ How They'll be Packaged

Call is for more convenient, easily-prepared meals of top quality to boost morale and fighting efficiency. New rations will save both space and weight, thus simplifying shipment. Foods will stay fresh longer, provide more use-flexibility. . . . Accent is on new freeze-dried and dehydrated items that may be easily reconstitued in the field.

ROBERT G. TISCHER

Director, Food Laboratories, Quartermaster Food & Container Institute for the Armed Forces, QM Research & Development Command, Chicago

PRIME OBJECTIVE of experienced USQMC planners is the quick-serve meal—lower in weight and volume and higher in capacity to maintain our soldiers in the top form needed to win.

The special proposal brings new thinking to the problem of feeding soldiers in the four field areas—Base, Reserve, Support, and Contact.

Briefly, the concepts emphasize:

1. **Tactical dispositions dictated by new nuclear weapons, and probably involving relatively small, highly dispersed forces operating for short periods in varying climates.**

2. **Development in food processing of fully practicable (commercial level) means of freeze-dehydration, or pre-cooking to be followed by dehydration.**

End-products sought here are quick-serve food items of great acceptability, considerable storage, life, and high field utility. Assembled into meal form, these components would answer the stringent demands of dispersed tactical operations.

When implemented, the new system is seen meeting the requirements of each section of the combat zone. These differ widely in their demands for food and their capability for efficiently using it (see accompanying panel for an outline of the field problem).

Specifics in the New Idea

A main item for the Base Area is the 25-man uncooked meal all ready for preparation and serving. It comprises such quick-serve foods as dehydrated lima bean soup, sweet potatoes and green beans; irradiated

components like chicken, ham, or bacon; and such side items as rolls, shortening, margarine, crackers, sugar, coffee, and salt.

Packaged entirely in paper and plastic containers of rectangular shape, this type meal primarily requires rehydration, followed by cooking of some components. Even this latter has been simplified—cutting down cook-training requirements.

These 25-man uncooked meals can, of course, be used as far forward as cooks, water, and a minimum of water-heating equipment are available to heat and serve them. Ordinarily, they'd be available as far forward as the Support Area.

Carrying the quick-serve meals one step farther—to the Contact Area—may be achieved with the 25-in-1 pre-cooked meal and also the 5-in-1 ration. These provide meal combinations for small or relatively large combat units.

Items here included such dehydrated dishes as chili and beans, chicken and rice, instant rice and pasteurized fruit mix. They're accompanied with pasteurized bread, crackers, margarine, jam, and drinks.

Again, packaging is in paper and plastic rectangular containers, providing more convenience in transportation and usage. However, there are extras—trays and spoons for added quick-serve convenience.

These meals may be used throughout the Reserve and Support Areas and sometimes in the Contact Area.

In the latter area, plans for the feeding system of the future include the prominent use of two rations —the individual, meal-type "C" ration and the ready-to-eat meal.

The meal-type "C" consists of a random selection of canned and dehydrated items, which are combined to increase flexibility of use in the field. Issue may be in individual units, meal packets, or in multiples of three as a complete ration. The random selection of units avoids menu monotony.

Examples of primary food components used are canned pineapple, boned chicken, fried ham, and beans with frankfurters. These are accompanied with items like crackers, chocolate fudge bars, coffee, cream, sugar, and gum.

This ration is now available. However, it only partially rates as a quick-serve—for it contains canned items which, while they may be eaten cold, are better appreciated if heated.

A sufficient number of menu variations are available for feasible use of this ration for two to four weeks.

PROBLEM THAT QUICK-SERVES TARGET

In the field, initial dependence is presently placed on trained cooks. Ration items are, to a great extent, canned. In addition to just heating, many foods must be cooked in the routine currently followed.

Then, as soldiers approach the Contact Area, there's still more dependence upon canned rations which, under the circumstances, must often be eaten cold, though intended to be consumed hot.

But now seen allayed—by new, better, quick-serve meals—is the old tendency of the men to become dissatisfied with their rations as they move from Base to Contact Area. Thus, morale would be promoted for greater combat efficiency.

The following outlines and illustrates the proposed system, in each case comparing with the current routine:

BASE AREA: Arriving troops (regiments and battalions) are fed new 25-man uncooked meal. Employed are cooks, ranges, and shelters. . . . Present system: "A" rations (perishable fresh foods and frozen produce) or "B" rations (varied non-perishable rations, each comprising over 100 components); highly trained cooks, plus ranges and shelters.

RESERVE AREA: Smaller groups of troops eat new 25-in-1 and 5-in-1 meals, also new meal-type "C." No trained cooks, ranges, or shelters required, but must have boiling water. . . . Present system: Troops continue to eat "B" rations prepared by cooks, and under some circumstances "C" rations.

SUPPORT AREA: Troops deployed in smaller groups being made ready for combat. New 25-in-1, 5-in-1, and meal-type "C," same as in Reserve Area. . . . Present system: Emphasis on standard "C" rations, with messing facilities likely difficult to find and food-preparing equipment scarce or absent.

CONTACT AREA: With formal messing not usually possible, troops get new ready-to-eat individual meal. No cooks, preparation, or facilities needed. Fighting man merely opens and eats improved cold meals. . . . Present system: Standard "C" and assault rations.

True quick-serves for the Contact Area are the ready-to-eat individual meals. Their development is still in the experimental stage, and there is not yet enough menu variation.

Specified are items highly acceptable in the cold state, thus requiring merely opening of packages and water to reconstitute drinks. Menus would cover all regular meals.

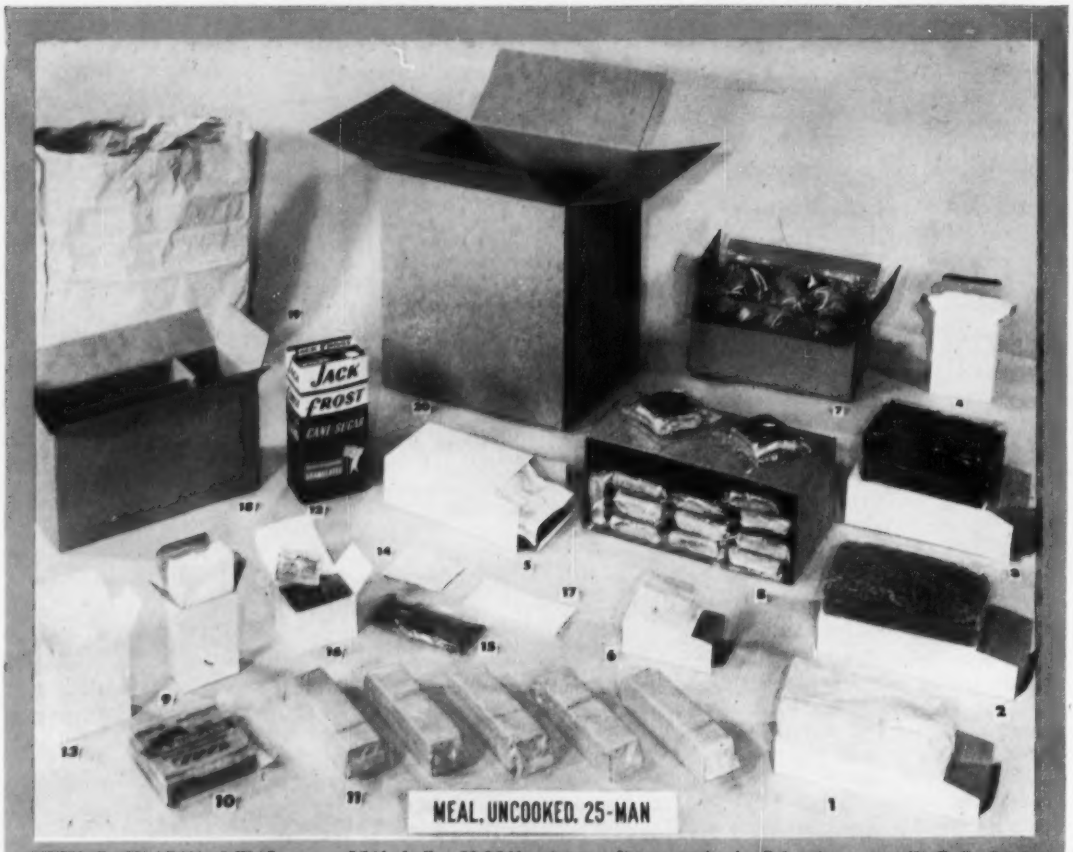
Aim is maximum subsistence value with minimum packaging. All told, the circumstances outlined would appear to indicate irradiation preservation as the most promising.

Thus far, selection of items has centered on those normally eaten cold, such as peaches, orange slices, tomatoes, and lettuce, as well as basic items like sliced ham, boned chicken, potato salad, and sliced roast beef.

To fill out and vary the ration, and so aid in balancing the menus, it will be necessary to add items like bread-rolls, fruit cake, jam, instant dry milk, coffee, sugar, cream, and chocolate nut cake.

Goal is the greatest taste satisfaction possible, while entailing the least distraction from the soldier's job of fighting. No heating of the foods is required.

Granted, production of sufficient variety in this type ration is difficult, since there aren't a great number of foods that may be eaten cold (with high acceptance) and which also may



NEW BASE-AREA MEAL saves 25% bulk, 50-85% weight. Dinner menu components are seen. At (1) is Lima bean soup, (2) sweet potatoes, (3) green beans, (4) orange juice, (5) apples, and (6) cheese (all latter items in polyethylene-Mylar bag-lined cartons). At (7) is chicken (irradiated, and packaged in polyethylene-Mylar bag, overpacked in a polyethylene-foil-scrim vapor-barrier bag-lined intermediate container). Other items are: (8) Rolls (Mylar bag over-packed, same as chicken), (9) shortening, (10) through (12) margarine, crackers, and sugar, respectively (commercial packs, except margarine is overbagged), (13) flour, (14) and (15) cinnamon and coffee, respectively (polyethylene-foil-paper combination), (16) cream (Pliofilm-foil-acetate combination), and (17) salt.

successfully be subjected to radiation. Arduous efforts are being made to widen the list of acceptable foods for this ready-to-eat individual meal.

Let's now consider the aspects of making meals quick-servable.

At present, combat calls for canned and heat processed rations, since there is an insufficient variety of the newer quick-serves to support a major combat effort.

Certain fairly well accepted items may, when eaten over a length of time, cause the soldier some distress. This fact, plus excessive water in canned items, motivated the search for lighter quick-serve foods with high acceptability.

First attempts to produce quick-serves resulted in a reorientation of presently available dehydrated foods. Then new freeze-dried and dehydrated foods were coupled with these items in the new 25-man uncooked meal.

This move makes possible a 40 or 50% saving in weight and some reduction in the amount of meal preparation. With these meals, however, there's still need for cooks, equipment, and shelters.

If cooking requirements could be eliminated, quick-serve meals would, it was thought, finally come into their own. Working in this direction, the next step was to learn how foods could be pre-cooked, then dehydrated and delivered to the soldier ready for use except just for rehydration with hot water.

An early survey of the situation taught us that many pre-cooked dehydrated foods were already in existence. And research has uncovered methods for preparing more.

Using these foods, which are packaged in appropriate Mylar plastic containers, the soldier need only provide himself with sufficient boiling water to pour into the prepared package, with allowance of 10 to 15 min. for rehydration.

It's noteworthy that pre-cooked dehydrated rations are not canned but packaged in containers made of plastic and paper-stock materials.

While savings in space are not large (perhaps ranging from 10 to 20%), savings in weight can be very great. As against canned juices, for instance, dehyrated fruit juices save as much as 85% weight.

A comparison with present rations

PROPOSED LUNCHEON MENU (one package to serve five men, Reserve and Support Areas) comprises: (1) Precooked dehydrated chili and beans, (2) instant rice, (3) dehydrated fruit mix (with sugar), (4) pasteurized bread, (5) crackers, (6) margarine, (7) jam, (8) cookies, and (9) instant cocoa drink. Polyethylene-Mylar packaging is employed on all but following three items: Bread (Mylar, with flexible, moisture-proof overwrap), crackers (commercial packs of four in 22-point chipboard tray, overwrapped and heat-sealed in foil-wax-tissue-wax laminate), and cookies (22-point chipboard tray, overwrapped and vac-sealed in polyethylene-Mylar). Items (10) through (13), respectively, are napkins, paper plates, and utensils (two packs). Finally, (14) shows completely assembled 5-in-1 package.

brings the proposed quick-serve meals into sharp focus relative to a number of important changes.

Switch from the old ration basis to the new meal basis provides greater flexibility in subsistence issuance and permits broader combinations of meal units in the field. This is not easy on the ration basis.

Need for refrigeration, trained cooks, and field ranges would change considerably. Given the new way, no refrigeration would be required and trained cooks would be needed only for the uncooked 25-man meal.

As for water, overall use in the new system would compare very favorably with that of present rations, despite the need for boiling water to reconstitute main items.

A logistical advantage would be the absence of extensive field ranges and other cooking equipment. Such weighty units are awkward to transport from one location to another. But the proposed meal system requires only water, which may be transported in standard, already-available water containers and heated with light and easy-to-handle chemical or combustion heating units.

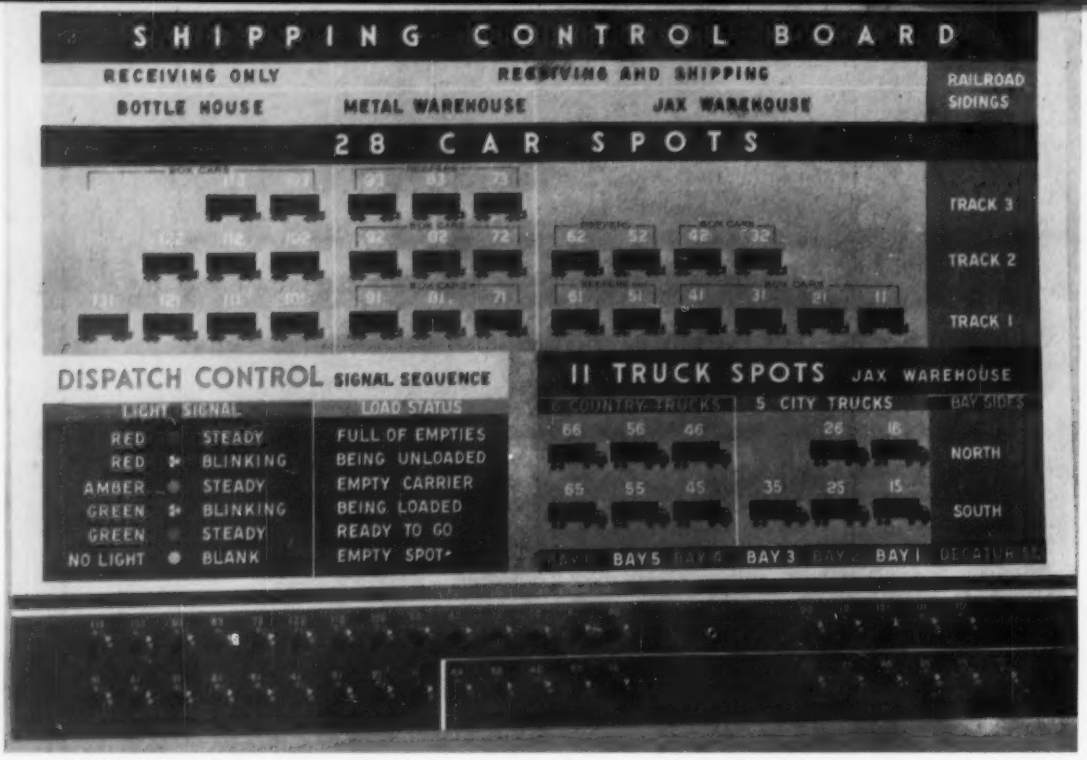
Finally, the quick-serve uncooked meals probably would be relished indefinitely. In addition, the 25-in-1 and 5-in-1 precooked meals will likely be acceptable by the men for as long as 90 days

As for the meal-type "C" ration and ready-to-eat individual ration, it is predicted that they would satisfy the combat soldier for as long as 30 days.

The new feeding system has been proposed to high level Army Staff, and a great deal of progress has been made in providing quick-serve items to fit into such a program.

At present, the quest goes on for greater variety, better stability, and higher acceptance of additional items to round out the quick-serve plan.

CONTACT AREA individual-package breakfast menu is made up of (1) dehydro-gamma-radiated orange slices, (2) gamma-radiated sliced ham, (3) pasteurized bread, (4) pasteurized pecan roll, (5) jam, (6) instant coffee, (7) sugar, (8) dry cream (coffee type), and (9) non-fat instant dry milk. Also seen are (10) cellophane-wrapped spoon and (11) carton that carries this meal. Packaging details: Polyethylene-Mylar film is used for the orange, ham, jam and milk items. Bread and pecan roll come in Mylar film with flexible, moisture-proof overwrap. Coffee is in polyethylene-foil-paper laminate pouch, while sugar is in polyethylene-coated kraft paper, and cream in Pliofilm-foil-acetate laminate pouch.



THIS ELECTRIC PANEL links shipping docks with dispatcher's office at Jackson Brewery. Each dock is represented by a car- or truck-body outline with three lights. Different color and condition of lights (code at left) are set by operator as he receives information on punch cards from shipping docks. It's done by turning knob switches at bottom of board.

Graphic Shipping-Control Board Monitors Case Handling

Just a glance at vari-colored lights on this panel tells dispatcher how loading and unloading of palletized cases are going at each of 39 car and truck spots. Thus he directs opposite flows of packaged beer and incoming empties to keep this plant on a "run-through" basis . . . Operations described . . . Flow of cases detailed

A. T. GAUDREAU
Management Consultant, Gaudreau, Rimbach & Assoc., Pittsburgh

SYNCHRONIZED FLOW of outgoing packaged beer and incoming empty containers has virtually eliminated the need for storage areas at Jackson Brewing Co., New Orleans.

A prime requisite for this advance was revamping of the plant for handling of palletized loads in units of some 50 cases. This entailed erection of two loading docks and other building modifications, as detailed in the accompanying diagrams, and it abolished most of the strenuous manual loading and unloading of carriers.

However, pushbutton controls are the key to keeping this plant on a "run-through" basis. They integrate the direct flow of cases from palletizers to outbound carriers with opposite streams of incoming cans and returned bottles.

Now, let us see how this brewery's production runs are synchronized with shipping operations.

A brewery's case flow may be divided into two successive paths pivoting on the bottle house. First, there is the route of empties from inbound carriers to the bottle house, then the return flow of filled cases from bottle house to outbound carriers. Storage areas are used to equalize feeding of empties into bottling lines with loading of fulls on the shipping docks.

When empties from inbound carriers go directly into soakers, cases are considered to be on a "run-through" basis since they bypass the storage area. On the return journey, when output of filled cases flows directly from packers into outbound carriers, fulls are similarly on a "run-through" basis.

In a one-product plant, these two flows could conceivably be linked at bottling machines to form a single continuous parade of cases from

inbound carriers, through packaging operations, and back into outbound carriers. Even in such a comparatively simple system, carriers and bottling machines could only work in unison so long as they worked simultaneously. Otherwise, an inventory would have to be maintained for empties on the intake stream and for fulls on the outgo from production lines.

At Jackson, however, round-trip case flow encounters many interruptions and unbalanced side trips not present in the above ideal run-through route. Yet, in setting up its case-handling modernization plan, this company applied the run-through principle to both empties and fulls, wherever possible.

This called for synchronizing production of specific case goods with loading of these identical products in boxcars, reefers, and trailers.

To keep bottle and can lines running directly into outbound carriers, production was adjusted, by trial and error, to coincide with shipments. After several months, this synchronized flow was attained for all but a few small odd-lot items, mostly in the tax-beer category.

Here is how it was accomplished:

Production is about evenly divided between rail and truck shipments. This division offered a convenient alternative between rail cars and trailers in routing production runs of specific products into carriers.

Since rail cars could be loaded at will within a given day, it was comparatively simple to direct production runs into these cars whenever scheduled trailers for the same product were not at hand. Thus, rail-car shipments could absorb production scheduled for trailers that failed to arrive on a given day, or did so a day ahead of time.

However, bottle-house production for a given day is governed by machine capacity, while shipments for the same day depend on distributors' orders. And these quantities never coincide in size or composition. In order to maintain production on a run-through basis, it was necessary to reconcile each day's total shipments with each day's total output for each type of product.

Problem and Solution

At this point we had the old problem of the "chicken and the egg." The question was which came first, production or shipments, in setting up production for a given week.

If shipments exceed output capacity at the beginning of the week, how would the shortage be made up except out of finished storage? On the other hand, if production exceeds shipments at the end of the week, where would the surplus output go except into storage to fill excessive shipments at the beginning of the following week?

These apparently irreconcilable problems defied solution until rail shipments were brought into the picture as a balancing medium between daily output and shipments.

It was found that rail cars could

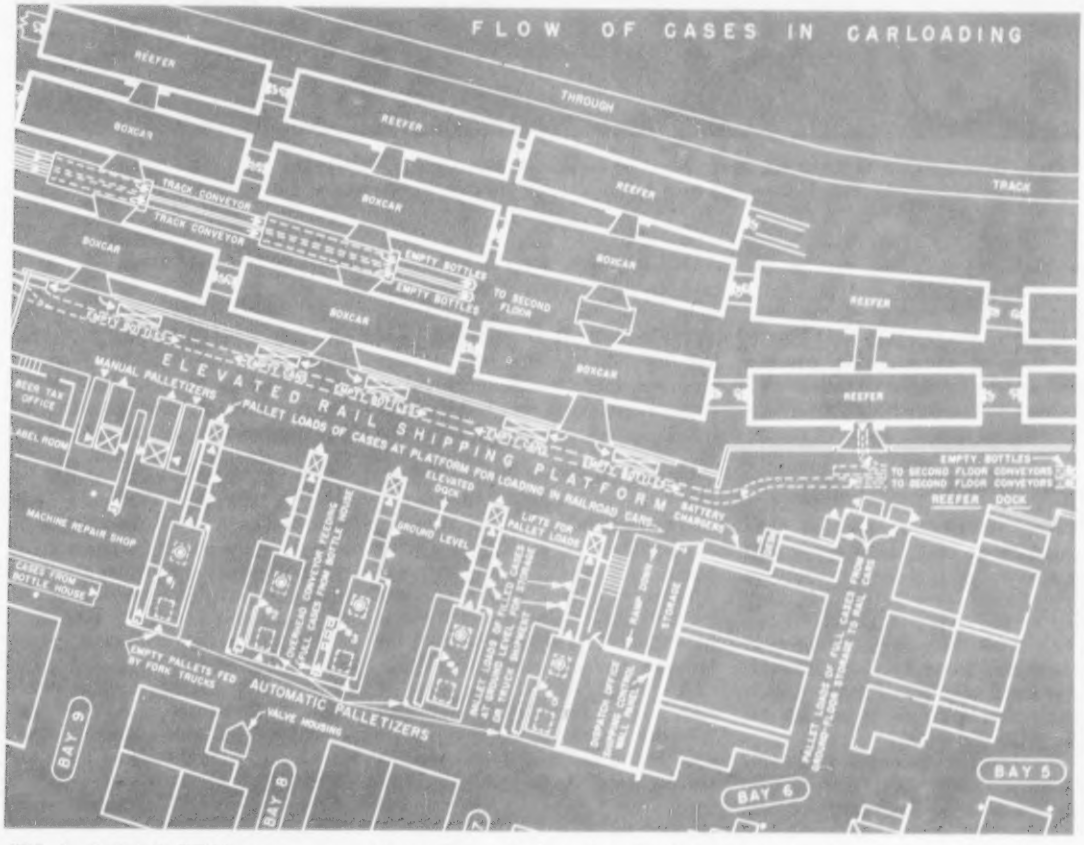


FIG. 1. CAR-LOADING is kept on "run-through" in control panel in dispatch office (center foreground). Palletized cases, from five machines to left of panel, go to elevated rail platform by lift, then are loaded into cars by fork truck. Note car-linking ramps (top), also incoming stream of empties.

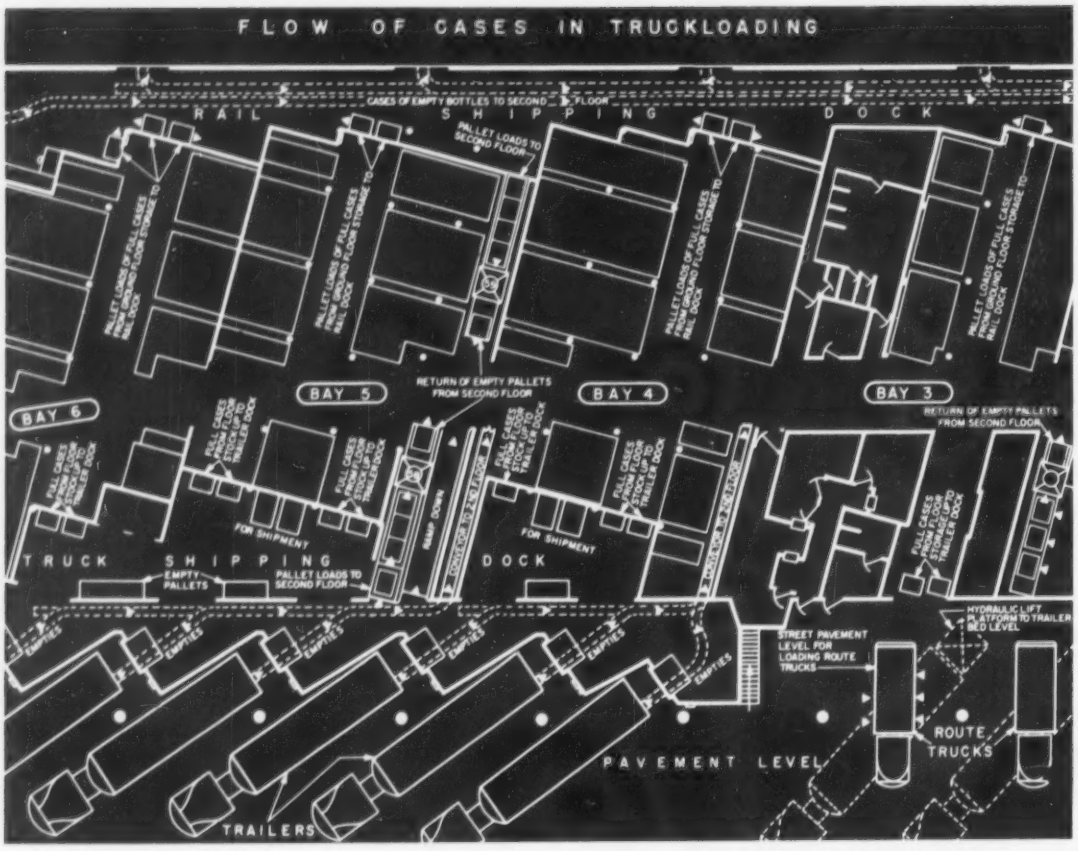


FIG. 2. **FOR LOADING TRUCKS,** cases are picked up at palletizers (shown in Fig. 1) and fork-trucked directly into trailers at about 48 per min. Palletized empties from trucks go to second floor by lift, such as No. 58 in Bay 5.

be loaded one or two days in advance of scheduled shipping dates without undue effect on distributors. Because of irregularities in car-routing time on the railroads, advance loading of cars offered the needed cushion without perceptibly affecting railroad delivery time.

System in Action

Now, distributors send in their orders for an entire week a few days in advance of that week. They are immediately summarized for each day by products and individual carrier. With these shipping orders as a basis, and taking into account whatever stock may be on hand, a daily production schedule is set up for the following week.

To equalize excessive shipments on certain days with excessive production on others, rail-car shipments are advanced or retarded one or two days either way. By adhering to this scheduling, all car shipments and virtually all trailer shipments are now being made on a run-through basis—by trucking palletized loads from production right into carriers.

The equivalent of less than one-half day's shipments is held in storage, and this consists of short-run products packaged in advance so as not to disrupt mass-production runs too frequently.

To carry out these shipping schedules, a dispatch office is maintained at a central point in the shipping warehouse, next to the palletizing machines. The daily shipping schedule by carriers, and by products for each carrier, is revised each morning to adjust for deviations from the previous day's schedule.

A running inventory is kept of each product from day to day. This tells the dispatcher at all times exactly how many cases of any product are on hand in the morning, how many are being produced and shipped that day, and what the closing balance will be at the end of the day. He has this information at his finger tips for some 50 items.

Panel Directs Case Flow

In addition to monitoring 50 products throughout his shift, the dispatcher must also know at all times what is going on in each of the 39 unloading and loading spots. This he accomplishes by means of an electric control panel (lead photo).

On this board, each of 28 car spots is indicated by a boxcar outline, and each of 11 truck spots by a truck-body outline. In each of these 39 carrier spots there are three little electric lights controlled by one of the 39 switches at the bottom.

The three lights in each carrier are colored red, amber, and green respectively. All can emit a steady light, and two of them (red and green) can also give a blinking signal as needed. Significance of these five light signals for each carrier spot is shown (on the photo) in the lower left-hand corner of the panel.

As a foreman on the rail dock or trailer dock starts or ends an operation in any of the spotted carriers, he

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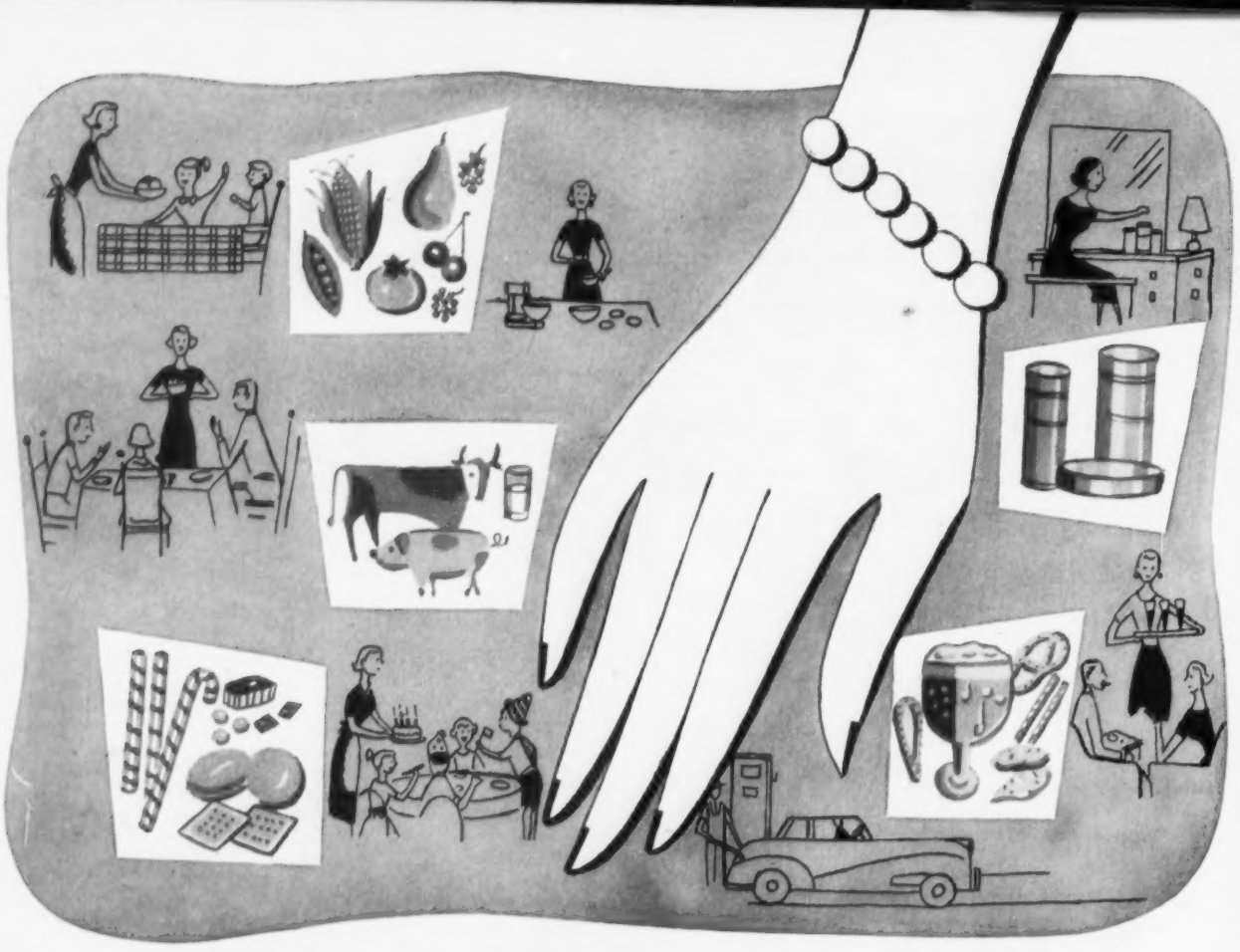

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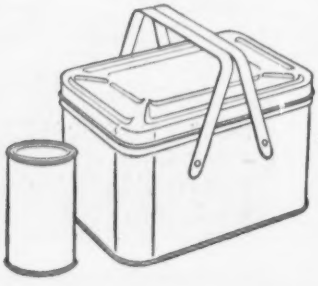


THE HEEKIN CAN CO. *PLANTS IN OHIO, TENNESSEE & ARKANSAS—SALES OFFICES; CINCINNATI, OHIO; SPRINGDALE, ARKANSAS*

time-stamps a punch card pre-written for this carrier and drops it into a box. Every half hour or so, these cards go to the dispatcher's office.

Using these cards as his cue, he then turns knobs at the bottom of the control board so that light signals indicate the unloading and loading status of each carrier.

Thus, by means of these blinking lights and colored signals, he sees and regulates (by pushbuttons) simultaneous unloading and loading of 28 rail cars and 11 road trucks. These operations extend over three tracks and streets, as well as on different sides of several buildings.

At a glance he can tell which cars and trucks are waiting to be unloaded, which ones actually are being unloaded, which are empty, which are actually being loaded, and those ready to roll.

From this panel he directs the flow (by fork truck) of hundreds of palletized loads of cases from five automatic palletizers, or occasionally they are taken out of storage.

Rail-Car Loading

Loads from palletizers in Fig. 1 (left foreground) are ejected to a floor-level conveyor, which links each machine with a corresponding vertical lift. Latter operates at the edge of the elevated rail platform.

Loads traveling along the conveyor may be picked up by a fork truck at ground level, or may continue to a vertical lift which automatically elevates and discharges them to the rail dock. Such loads as are intercepted on the ground floor may be routed to floor storage, or to the truck-loading dock.

Pallet loads on the elevated rail dock are immediately picked up by fork trucks and carried into any of 19 rail cars spotted along this platform (11 of which are shown on Fig. I). None of these loads are ever stored, but flow directly into outbound carriers.

Ramps link the rail dock with each car spotted on the first track along the building, also with cars on the second and third tracks (farther away from platform). Some of these ramps are fixed and others are portable, depending on anchorage facilities.

Flow of cases in truck-loading is shown in Fig. 2.

Storage area for 100,000 cases of empty bottles is on the second floor of the row of warehouses. Those received in pallet loads at docks are trucked out of the various carriers, and to a roller conveyor feeding one of three vertical lifts. Latter units raise pallets to second floor.

Flow of empties on this level is indicated by Fig 3, which shows a section of the floor (Bays 4, 5, and 6). Note absence of square corners, due to angular junction of bay-separation walls with outside building walls.

Empties to Second Floor

Two of the vertical lifts are seen in Bay 5 (circled numbers 58 and 59). In lift 58, pallet loads are received from trailer docks fronting the warehouse, while in lift 59, loads come from rail dock along rear wall of building. Empty pallets return to ground level on downward trips of these lifts.

Since not all empties are received in palletized loads, there is some manual unloading of rail cars. However, plans are under way to automate this operation, too. In the present system, flow from rail cars is shown starting in the upper left corner of Fig. 3.

From this corner, cases move to the right and complete a circuit inside the four walls of the building. At the upper left corner of Bay 6, the 6-deck conveyor enters two 3-deck inclines which discharge to the bottle house in two parallel runs of four decks each. When this operation is automated, this conveyor gallery will house a moving "sidewalk," which will carry pallet loads of empty bottles directly to depalletizers situated in the brewery bottlehouse.

Cases of empties from trailers on the lower level follow about the same route as those coming from the rail docks.

These movements will cease when the new system is installed. Instead, all cases will be palletized and come up on the vertical lifts. They will then be picked up by fork truck and transferred to the bottlehouse by conveyor.

The above article is based on the paper "Pushbutton Carloading In A Palletized Brewery," given by the author at the recent annual meeting of the American Society of Mechanical Engineers in New York City.

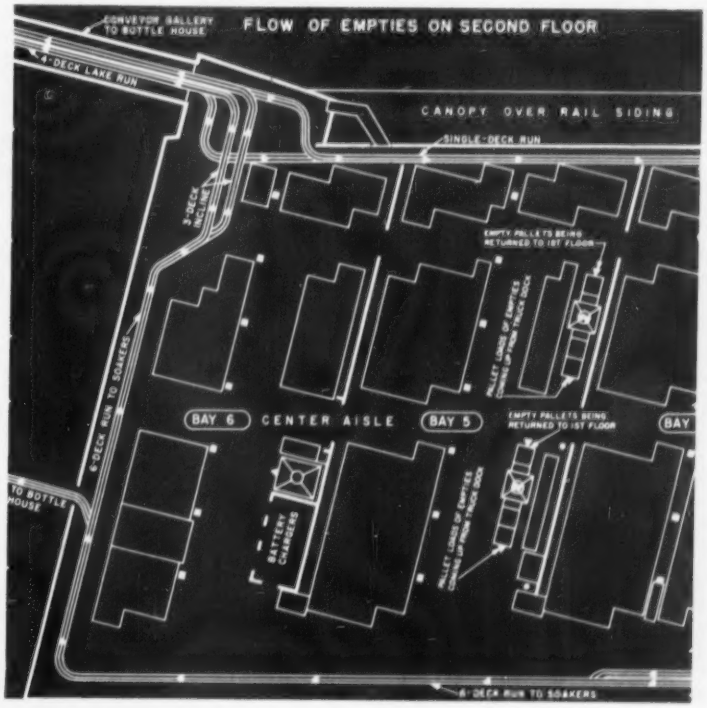

FLOW OF EMPTIES ON SECOND FLOOR
CONVEYOR GALLERY TO BOTTLE HOUSE
4-DECK LAKE RUN
CANOPY OVER RAIL SIDING
SINGLE-DECK RUN
3-DECK INCLINES
EMPTY PALLETS BEING RETURNED TO 1ST FLOOR
PALLET LOADS OF EMPTIES COMING UP FROM TRUCK DOCK
6-DECK RUN TO SOAKERS
BAY 6
CENTER AISLE
BAY 5
EMPTY PALLETS BEING RETURNED TO 1ST FLOOR
BAY
TO BOTTLE HOUSE
BATTERY CHARGERS
PALLET LOADS OF EMPTIES COMING UP FROM TRUCK DOCK
6-DECK RUN TO SOAKERS

FIG. 3. EMPTY CONTAINERS go to second floor for storage, if necessary, or directly by conveyor to soakers in bottlehouse. Arrows trace path of cases (starting at upper left), which is a complete circuit around the four walls of the building.

How to Get the Most Out of Your Lift-Trucks

This point-by-point breakdown on things to check during weekly, monthly, and semi-annual inspections will put punch in your preventive maintenance program, keep these expensive machines running longer and better

PART II—PERIODIC CHECKUPS*

This article was provided specifically for "Food Engineering" by The Materials Handling Institute, Pittsburgh, and was prepared by Robert T. Scott and Walter Bleckmann.

SERVICE LIFE of your lift-trucks can be increased immeasurably by a planned program of systematic inspections and lubrication.

Once established, your preventive maintenance program will keep on working for you through the years—long after the initial costs have been amortized. Dividends will accrue, too, in the form of lower service budgets, reduced truck down-time, and smoother-running plant operations.

In addition to the regular daily inspection conducted by the operator (Part I, FE Jan., p. 88), proper servicing of a lift-truck necessitates three other regularly scheduled inspections: 1. Weekly, 2. Monthly, and 3. Semi-annually.

*For operating angles, see Part I (FE Jan., p. 88).

Checkmarks spot important fork truck inspection points

Recommendations of many truck manufacturers for the weekly (50 hr.) inspection are as follows:

Weekly Inspection

WASHING & CLEANING: Machines should be washed and cleaned completely. Where grease is present, a steam hose can be used to speed work. Blow out radiator fins with compressed air. When the truck has been used in a dusty environment, remove covers from motors, controllers, contactors and limit switches. And after bleeding the plant airline of moisture, *gently* blow out dust that may have worked into these parts.

LUBRICATION: Always follow manufacturer's recommendations when lubing trucks. In general, this operation consists of "Alemiting" steering connections and other bronze bushings. Some firms make blow-ups of manufacturers' lubricating charts for hanging on the wall of the maintenance department to serve as a reminder and guide.

Keep distributor cup filled with grease. Use no more than one drop of oil on the distributor cam pad. Oil generator and starter motors lightly, one or two drops in each cup.

Check oil and/or grease level in drive axle, steering axle, and steering gear box. Change engine oil and oil-filter cartridge. The usual viscosity recommendations are:

SAE 10—below 0F.
SAE 20—0 to 32F.
SAE 30—above 32F.

AIR CLEANER: Remove air-cleaner body and cup and wash in kerosene, or other cleaning solvent. Dry with compressed air and refill to oil level, or slightly below if the truck is used on ramps. Also clean fuel screens on fuel pump, carburetor, and gas tank.

STEERING GEAR: Check for security at mounting. There should be no more than 4 in. of play in the steering wheel. Examine rods and lever. If rods are bent, straighten them.

BRAKES: Test service (foot) brake for stopping under full load. Test parking brake for holding full load on the steepest incline on which the truck is used. Foot brake should take hold upon being depressed 2 in. (one-third of the way down). Hand brake should hold at three to five notches or "clicks" on the ratchets. If it doesn't, brakes must be adjusted.

BATTERY: Be careful with batteries. Overwatering will weaken the electrolyte. The exterior of the battery and battery case should be washed carefully if there is evidence of corrosion, and electrolyte level should be kept ¼ in. above the plates.

HYDRAULIC SYSTEM: With forks down, check oil level in the hydraulic tank. If foreign matter is observed, drain immediately and refill with clean oil. Inspect both rigid and flexible lines for leakage. Check pump and valves for leakage.

LIFTING MECHANISM: Lubricate according to manufacturer's recommendations. Weekly maintenance

Gas and Electric Fork Truck Inspection

INSPECTION TO BE PERFORMED: 8 ☐ 40 ☐ 300 ☐ 1000 ☐ HOURS DATE _____ MACHINE SERIAL NO. _____

HOURS 8	40	300	1000		OPERATION
					Battery and Electrical
☐	☐	☐	☐	E	Water level, hydrometer reading, cables, receptacle terminals.
■	☐	☐	☐	G	Water level, hydrometer reading, cables, terminals.
■	■	■	☐	E	Pump and drive motors, inspect, clean and repack or replace bearings.
☐	☐	☐	☐	G&E	Head and stop lights.
☐	☐	☐	☐	G	Gauges, fuel, ammeter, oil, temperature, hour meter.
■	■	■	☐	E	Pump and Drive Motor Brushes, inspect and replace if necessary.
■	☐	☐	☐	E	Contractor Panel, clean and adjust points and devices.
■	☐	☐	☐	G&E	Terminals, leads, connections.
					Wheels and Brakes
☐	☐	☐	☐	E	Service and seat brakes, check efficiency.
■	☐	☐	☐	G&E	Return spring, free play, master cylinder, leaks.
■	■	■	☐	G&E	Check shoes, linings, lines, connections.
☐	☐	☐	☐	G	Service and seat brakes, brake lock, check efficiency.
☐	☐	☐	☐	G	Tire pressures, drive, steer, check condition.
■	■	■	☐	G&E	Clean and repack bearings (full floating drive axle type).
■	■	■	☐	G&E	Clean and repack gears and bearings (pinion drive axle type).
■	■	■	☐	G&E	Clean and repack bearings (steering axle).
					Lubrication
☐	☐	☐	☐	G	Check engine oil level.
■	☐	☐	☐	G	Change engine oil, oil filter, air cleaner oil.
■	☐	☐	☐	G	Oil cups, generator, (2 drops each end), starter (2 drops)
■	☐	☐	☐	G&E	Lubricate all high pressure fittings.
■	☐	☐	☐	G&E	Clean and lubricate innerslides, oil lift chains.
■	■	■	☐	G&E	Lift chains, remove, clean, lubricate, install, adjust.
■	☐	☐	☐	G&E	Lubricate miscellaneous linkage, and clevis.
■	☐	☐	☐	G&E	Check steering gear oil level.
■	☐	☐	☐	G&E	Check drive axle oil level.
■	■	■	☐	G&E	Drain and refill drive axle.
					Hydraulic and Upright
☐	☐	☐	☐	G&E	Hydraulic system, operation, lift, tilt, oil level.
■	☐	☐	☐	G&E	Check pump, valve, tank, lift and tilt cylinders.
■	☐	☐	☐	G&E	Clean tank filler cap.
■	☐	☐	☐	G&E	Examine upright, lift chain adjustment.
■	■	☐	☐	G&E	Check lift brackets, slide strip wear, equalize lift chains.
■	■	☐	☐	G&E	Tilt cylinders, check, glands, boots, mounting pins.
■	■	☐	☐	G&E	Check tilt cylinder drift (6" max. allowable in 5 min.).
■	■	☐	☐	G&E	Lift cylinder, packing, boots, vent.
■	■	☐	☐	G&E	Check lift cylinder drift (6" max. allowable in 5 min.).
■	■	■	☐	G&E	Check pump pressure, valve pressure, lines.

HOURS 8	40	300	1000		OPERATION
					Engine
☐	☐	☐	☐	G	Air cleaner, clean cup, screen.
■	☐	☐	☐	G	Distributor, grease cup, cam pad.
■	■	☐	☐	G	Refill distributor shaft reservoir (SAE-20 oil)
■	■	☐	☐	G	Distributor, adjust points, inspect rotor, cap, condenser.
■	☐	☐	☐	G	Fan belt, tension, condition.
■	☐	☐	☐	G	Fuel pump, clean screen.
■	■	☐	☐	G	Spark plugs, clean, adjust gap.
■	■	☐	☐	G	Carburetor, clean, adjust.
■	■	☐	☐	G	Valve tappets, inspect, adjust.
■	■	☐	☐	G	Ignition timing, check, adjust.
■	■	☐	☐	G	Compression, all cylinders.
■	■	☐	☐	G	Cylinder head, nuts, gasket, leaks.
■	■	☐	☐	G	Manifolds, nuts, gaskets, heat control, leaks.
■	■	☐	☐	G	Check condition of muffler, mounting, connections.
■	■	☐	☐	G	Governor, speed, surge.
					Clutch and Transmission
☐	☐	☐	☐	G	Clutch throw-out bearing (1 turn of cup).
■	☐	☐	☐	G	Check clutch adjustment, slipping, grabbing.
■	☐	☐	☐	G	Clutch pedal free play.
■	☐	☐	☐	G	Drive, clean housing, screens, brushes, collector rings.
■	■	☐	☐	G	Universal joints, clean, check condition.
					Cooling System
☐	☐	☐	☐	G	Radiator, water level, anti-freeze.
■	☐	☐	☐	G	Examine core, hoses, check for leaks.
					Miscellaneous
☐	☐	☐	☐	G	Check fuel supply, refill tank.
■	☐	☐	☐	G&E	Steering gear, inspect mounting.
■	■	☐	☐	G&E	Drag link adjustment.
■	■	☐	☐	G&E	Check turning radius.
■	☐	☐	☐	G&E	Clean machine thoroughly.
■	■	☐	☐	G&E	Steering axle, inspect tie rod ends.
■	■	☐	☐	G&E	Axle pivot pins, spindles.
■	☐	☐	☐	G	Gas filler cap, clean screen.
■	■	☐	☐	G&E	Inspect springs, shackles, U-bolts, clips.
■	■	☐	☐	G&E	Tighten all bolts, nuts and cap screws.
■	■	■	☐	G&E	Inspect lift forks, mounting welds, trueness.

Note: G = Gas Trucks. E = Electric Trucks.
Light squares indicate service to be performed.

DRIVER _____
SERVICEMAN _____
FOREMAN _____

REMARKS _____

COURTESY CLARK EQUIPMENT CO.

should include lubrication of hoisting-piston head-sprockets and upright supports. Innerslides should be lubricated with graphite paste. Chains should be examined, cleaned, and wiped with oil (SAE 10).

Hoist and tilt cylinders may show leakage at the stuffing boxes on new trucks soon after they have been put into operation. This is due to compression resulting from wax impregnation of the packing rings. Should this occur, add additional rings and pull up snug—but not too snug or you will cause premature wear.

FORKS: Check forks to ascertain whether twisting or distortion has occurred.

RADIATOR: Check radiator cap and replace gasket if lost. Blow out cores if plugged with lint or dirt, and make certain the overflow pipe is clear. Examine the water. If oil of any quantity is present, determine the source. Examine for general leakage.

Much of the foregoing can be applied to both gas and electric trucks. Here, now, are some items that apply only to electric powered trucks:

BATTERY: Keep battery clean and dry. And give it an equalizing charge according to maker's specs.

SEAT BRAKE: Where a seat interlock is used, check adjustment. Brakes should not drag when seat is down, but should lock firmly when seat is up.

DRIVE MOTOR: Check motor insulation and terminal studs. The latter should be tight and coated with insulating paint. Tighten drive motor belts.

Monthly Inspection

There should be great care in the performance of the monthly (300 hr.) inspection, since it covers inspection of parts on which wear may not be immediately apparent. And all of the items previously listed in the weekly inspection should be repeated at this time.

In addition, tighten cylinder head nuts with a torque wrench—not by feel. The recommended sequence for tightening should be used. Examine edges of head gasket for leaks. Check heat control valve for proper functioning and examine the exhaust manifold for leaks. Tappet valve adjustment and ignition timing should be checked during the monthly inspection. Also check the brake-fluid level.

Look over all nuts and bolts. If there is evidence of corrosion, eliminate the cause. Remove corroded nuts and bolts, clean, and cover lightly with grease.

DISTRIBUTOR: Clean grease from outside cover. Inspect rotor, cap, and condenser. Inspect and adjust the contact points. "Blue" contact points are caused by high resistance or an open condenser circuit. "Black" points are due to burning oil and grease, probably caused by excessive lubrication of the cam.

SPARKPLUGS should be cleaned, tested, and the gaps set according to "specs." Replace plugs which have cracked insulators or loose electrodes.

CARBURETOR must be removed and thoroughly cleaned in solvent. Air dry before reinstalling. Adjust choke and throttle linkages. Make final adjustments on carburetor after inspecting electrical system and other fuel system supply components.

GENERATOR & STARTER: Remove covers and examine brushes for proper bearing and pressure on commutator. Check brush spring tension. Brushes should have at least 60% bearing surface. Use only factory recommended brushes, and see that "pigtails" do not restrict free action of brushes and do not short against frame or cover. Commutator should be bright, clean, and free from pitting. Slots between bars should be clean, and the mica separations kept below the level of the commutator bars.

LIFT & TILT MECHANISM: Inspect and equalize lift chains. If chains are defective, replace the entire chain. Do not replace sections. Check lift bracket rollers and sprockets for smooth, free operation. Check glands, packing boots, and mounting pins on tilt cylinders. Check packing boots and vents on lift cylinders.

STEERING & WHEEL ALIGNMENT: Make certain tires are properly inflated before checking steering or wheel alignment. Steering connections should be checked, adjusted, and lubricated before wheels are aligned (truck-weight should be on the wheels).

CONTACTORS (Electric powered truck): With the cover removed, examine contactors for proper functioning. Place controller lever in first speed, depress pedal, and note whether contacts are breaking and closing properly. Examine the contactor tips for burning and wear. Some transfer of metal is normal, and if it does not interfere with the closing of the circuit, let it alone. Use a spring scale to correctly adjust spring tension according to maker's recommendations.

CONTROLLER: Remove cover and see that controller fingers are making proper contact with the drums. All finger tips should be in exact line and evenly spaced on neutral center. Inspect contact tips and segments for pitting. If tips are badly pitted, it is probably due to weak finger tension. Check tension by lifting each finger off controller and seeing if it snaps back freely and quickly.

Six Month Inspection

The 1,000-hr., or semi-annual, inspection includes examination of the slower wearing parts and other items not routinely inspected weekly and monthly.

WHEEL BEARINGS: Remove wheels and examine bearings for cracks, broken rollers, and excessive wear. Replace as required and repack with recommended lubricant. Also clean and repack spur gear and ring gear on drive wheels.

BRAKES: Inspect brake linings for dirt, grease, and wear. If they are excessively dirty, wash in carbon tetrachloride, or other solvent. Dry before replacing. If linings are glazed, score them with a wire brush. If the lining is worn it should be replaced before the brake drums are scored. Inspect drums to make sure they are not scored or rough. Where brakes are timed with an electrical interlock to main travel controller and contactors, care must be taken not to disturb the timing when adjusting the brakes.

LUBRICATION: Drain transmission and differential gear boxes when hot. Be sure to clean magnetic drain plugs of all metallic particles before reinstallation. Fill with recommended lubricant (usually SAE 90).

HYDRAULIC SYSTEM: Drain system by disconnecting high-pressure line from hydraulic valve and operate engine until entire system is drained. Reconnect the high pressure line and refill the system with manufacturer-recommended hydraulic oil. In any case, oil used should have low pour point, rust inhibiting, and nonfoaming characteristics. Check valve pressure and pump pressure with gage.

CHAINS & FORKS: Check forks for even mounting. A ¼-in. difference at the ends is permissible.

Finally, remove chains and clean in kerosene. Dip in engine oil (SAE 10). Drain, then install and adjust.

Mr. R. E. Randall
BUYER
Libby, McNeill & Libby
Chicago, Illinois

"People often are hoggish about paper towels"

WITHOUT realizing it they'll use from two to four single fold towels just for drying.
— wasting up to 40 inches of towelling.
But you can control this waste.
With savings up to 40%!
How?
*By installing WESTROLL TOWELS in West Micromatic Cabinets.**

PEOPLE quickly unroll as little or as much as they want. But without realizing it they take less. Averaging 17 inches of soft, absorbent WESTROLL.
Saves janitors' time, too.
— one filling of the tamper-proof cabinet equals four of a single fold towel dispenser.
— there's less litter to clean up.
And washrooms are cleaner, neater.
**Cabinets are foamed.*

"Westroll Towels cost us 30% less across the U.S.A."

"When you're concerned with a multi-plant operation such as ours, a small savings in an expendable item such as paper towels can mean many valuable dollars saved at the end of the year. We found, by using Westroll Towels in the Micromatic Cabinet, that our costs were reduced by 30% based on a closely supervised comparative test against interfold towels," says MR. R. E. RANDALL, Buyer for Libby, McNeill & Libby, Chicago.

"With these savings, it was only natural that we should shift a major portion of our plant facilities throughout the country over to this efficient and economical toweling. Our washrooms remain neater, too; and we realize additional savings in cabinet-filling time and janitor clean-up time."

Would similar economies interest you? Send the coupon.

LARGEST COMPANY OF ITS KIND IN THE WORLD

WEST DISINFECTING Company

WEST DISINFECTING COMPANY, 42-16 West Street, Long Island City 1, N. Y.
Branches in principal cities • In Canada: 5621-23 Casgrain Ave., Montreal

☐ Please send your free folder on cutting towel costs with Westroll.
☐ Please have a West representative telephone for an appointment.

Name.....

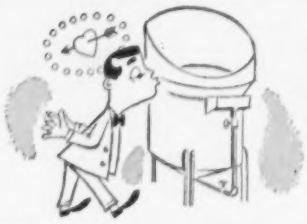
Position.....

Mail this coupon with your letterhead to Dept. 22

For more data, circle this page number on card at back →

Using Salt Efficiently

by **INTERNATIONAL SALT COMPANY, INC.**—America's largest producer of salt



You Can Save Money on Water Softening—With a "Lixator"

Today, a great many companies using zeolite water softeners are faced with this problem: While the water softener (which needs periodic regeneration with brine) gives excellent performance—regeneration is often costly, time-consuming, and causes substantial waste of salt. This is generally the case when salt is dissolved to form brine without the proper controls.

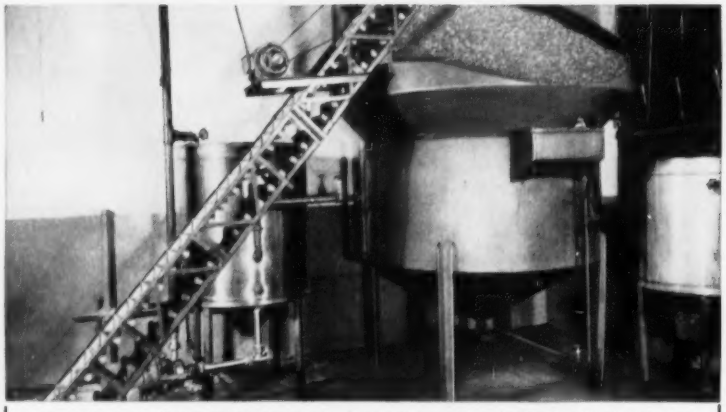
In most plants, however, it *is* possible to reduce this high cost of water-softener regeneration. The method is simple and effective: Always regenerate with pure, fully saturated brine—the type of brine made in a Sterling Lixator. Here are some of the reasons why Lixate Brine can save money for users of zeolite water softeners . . .

The Sterling Model Lixator is the most efficient and economical rock-salt dissolver ever developed. Wherever this fully automatic unit is used in water softening, it reduces the amount of salt consumed . . . eliminates dry-salt spillage . . . and simplifies the entire brine-making process. Developed and patented by the International Salt Co., the Lixator combines rock-salt dissolving and brine filtration in one simple operation. It delivers fully saturated crystal-clear brine *automatically* to any point within a plant. The Lixator is also remarkably easy to maintain, and has no moving parts to get out of order.

In operation, a Lixator need not replace the salt-dissolving tanks furnished by water-softener manufacturers. Instead, Lixate Brine is piped to these tanks—which then serve as the storage and measuring tanks from which brine is withdrawn for use.

Salt handling reduced. Because Lixate Brine is *piped* to points of use, the work of hauling dry salt from storage piles to the location of the water softeners is eliminated. Also, because of this direct-piping feature, the Lixator (and the salt that feeds it) can be placed anywhere in the plant, to make the most efficient use of available space. With a self-feeding hopper for salt, the Lixator operates automatically, without attention, and with little or no salt handling.

Lixators are made in a variety of types and sizes— to meet the brine needs of individual plants. The principle by which they operate can benefit the largest factory, or even a plant of moderate size.



At the Libby, McNeill & Libby plant in Hartford, Wisconsin, this Sterling Model Lixator is used for efficient, low-cost water-softener regeneration. A mechanical conveyor fills the Lixator hopper from a nearby rock-salt storage pile. In *your* plant, a Lixator can also produce substantial savings on salt—and in salt handling as well.

Complete regeneration. Since Lixate Brine is always 100% saturated, it provides complete water-softener regeneration each time. This means that extra regenerations—with the consequent use of more salt—are eliminated. Still another advantage results from using Lixate Brine: Water-softener operators will not use any more of this brine than is needed for each regeneration. What often happens in the case of unsaturated brine is that excess amounts are used in an attempt at complete regeneration. In the long run, this always results in a costly waste of salt.

Keeps water softeners clean. Besides being fully saturated, Lixator Brine—produced in a Lixator from economical grades of Sterling Rock Salt—is also self-filtered, and free from insolubles or other foreign matter. As a result, it will not introduce dirt or other "clogging material" into the zeolite bed of the water softener. This has proved to be a particular advantage in industrial water softening—because the zeolite stays in good condition longer. Lixate Brine is also free from acids or alkalies. Thus, being neutral, it cannot adversely affect the performance of any zeolite water-softening system.

TECHNICAL SERVICE WITH YOUR SALT

Through skilled and experienced "Salt Specialists," International can help you get greater efficiency and economy from the salt you use. International produces both Sterling Evaporated and Sterling Rock Salt in all types and sizes. And we also make automatic dissolvers in metal or plastic for both kinds of salt. So we can recommend the type and size of salt most perfectly suited to your needs.

If you'd like the assistance of an International "Salt Specialist" on any problem concerning salt or brine—or further information on water-softener regeneration—just contact your nearest International sales office.

International Salt Co., Scranton, Pa.

Sales Offices: Atlanta, Ga.; Chicago, Ill.; New Orleans, La.; Baltimore, Md.; Boston, Mass.; Detroit, Mich.; St. Louis, Mo.; Newark, N. J.; Buffalo, N. Y.; New York, N. Y.; Cincinnati, O.; Cleveland, O.; Philadelphia, Pa., Pittsburgh, Pa., and Richmond, Va.

FOR INDUSTRY, FARM, AND THE HOME—
STERLING SALT
PRODUCT OF INTERNATIONAL SALT CO., INC.

ing. But this ran us into a problem:

Packaging Ideas Spark Topgrade-Quality System

Radically different colored materials are used by meat packer to enhance labeling and wrapping of pork products. Thus, brand identity is accented, for plan gears up with new grading to flag company's premium products

JOHN E. THOMPSON
President, Reliable Packing Co., Chicago

SPEARHEADED by outstanding labeling and packaging, a product-grading system can play the key role in establishing consistent uniform-quality.

This was our conclusion at Reliable Packing Co. when we set about building brand recognition for our items—from fresh and cured pork products through to carcasses. We aimed to have wholesalers relate our goods with top quality, thereby enabling us to capture a fair portion of the local market.

Naturally, the wholesale buyer of pork expects to get a proper assortment of lean, fat, and in-between cuts just as they come from the cutting floor. But the hurdle here has been the fact that this pork buying has been on the weight basis.

To clear that hurdle, we inaugurated our special system of quality-grading and brand-labeling—with emphasis on new labeling and packaging.

Thus, butchers purchasing our Thompson Farms items know just what they are getting. Further, customers buying cuts from the meat-type hogs get less fat and bone per pound. Meats, too, are juicier, and more tender.

Closeup of Program

First, we concentrated on our own buying of the "top of the market" meat-type and regular lighter weight hogs. With meat-type hogs, there are two limiting factors—supply is restricted to under 20%, and there are certain inaccuracies involved in live grading.

Accordingly, we set about training our buyers to be more accurate in recognizing and grading the meat-types. Even so, some carcasses still produce cuts that must be down-graded and packaged under our Special brand label. Of course, that means losing the extra-price difference received for select, lean meat-type cuts.

Next step was to train workers on our slaughtering and pork-cutting lines, as well as those in the smoked-products cooler, to carefully select and grade such products as carcasses, loins, Boston butts, smoked hams (with and without shank), slab and sliced bacon.

Loins from meat-type hogs, for example, are further trimmed of excess fat and spotchecked to average 3.2 sq. in. of firm, red meat in the loin eye—available in 8 to 12-lb. and 12 to 14-lb. ranges. Loins from the lighter weight hogs of the top quality necessary for Thompson Farms brand approval are packed in 4 to 6-lb., 6 to 8-lb., and 8 to 10-lb. ranges.

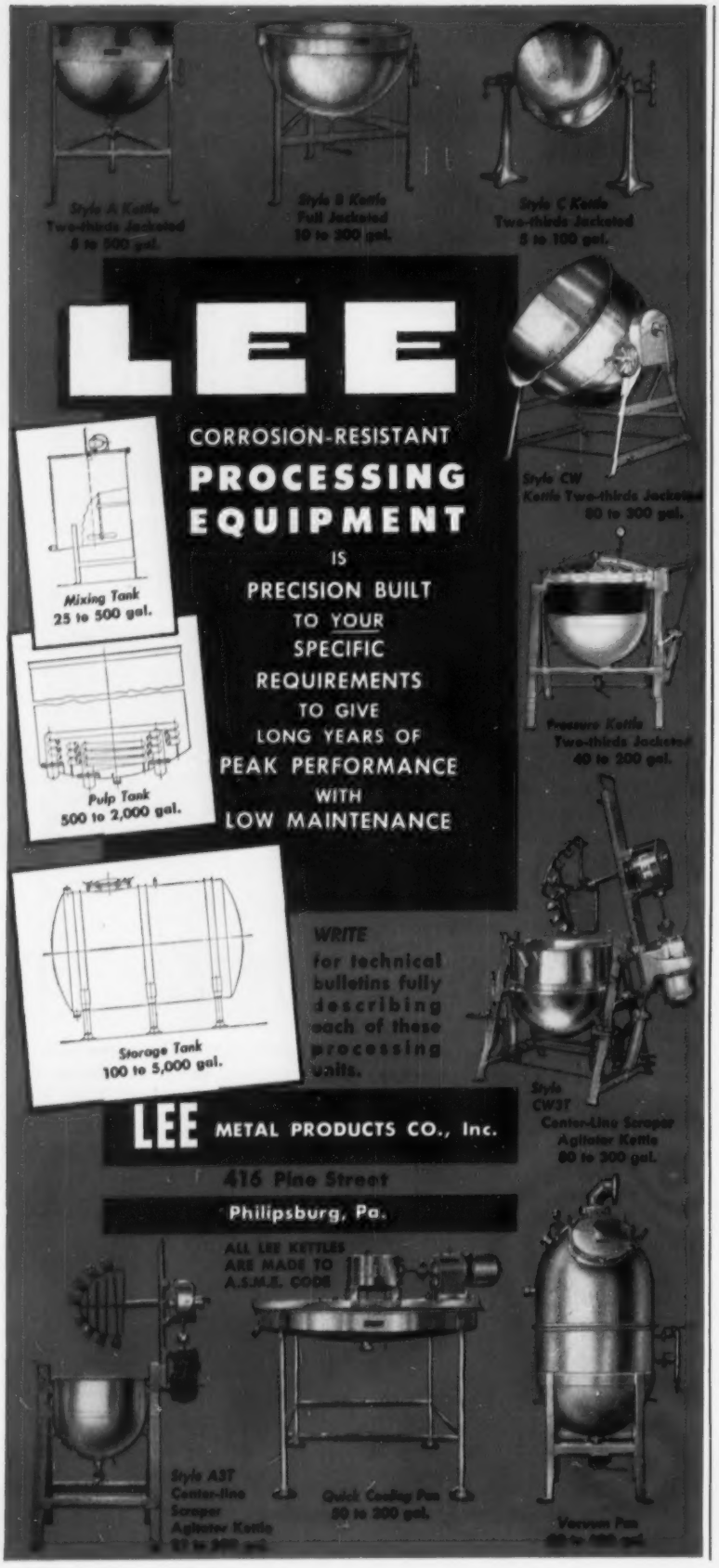
Meanwhile, we worked for tighter control over quality of smoked items like hams and slab bacon by grading them after, instead of before, smok-

Three Firsts

3-COLORED STICKERS, applied with edible adhesive, replace former, hard-to-identify ink-branding technique.

COLOR-PRINTED polyethylene bags protect carcasses, give them more attractive appearance than kraft paper.

LOINS, TOO, are wrapped in color-printed parchment, then packed in 3-color-printed brand carton.



ing. But this ran us into a problem: The brand smeared and became difficult to identify. For the branding ink didn't adhere to smoked products. It requires a wet skin surface.

After some researching, however, we came up with the solution—an edible gelatine-type adhesive with which to apply a circular (3¾-in. dia.), 3-colored label to the items. This does away with branding. The coded yellow, light green, and dark green sticker identifies product, grade-brand, and packer. It's manually applied in the cooler with a gum-label dispenser.

The grading after smoking proved definitely better. In fact, some items that would have rated the top label in prior branding were found after smoking to require down-grading to our Special brand label.

New Wraps Contribute

Another quality-promoting feature is our new eye-appealing packaging of products. Our company scored a first, we believe, in wrapping graded fresh pork cuts (loins and Boston butts) in 3-color-printed wet-strength parchment paper, identifying product, brand, and packer.

And these fresh, wrapped pork cuts are also packed in a variety of weight ranges in 3-color, water-proof paraffined cartons, instead of going unwrapped in unattractive barrels, wire-bound boxes, and nonprinted cartons.

Selection of colors for our wrappers and stickers for smoked items and cartons was handled by the Color Research Institute, of Chicago. Contrary to past thinking in the meat field, the Institute chose green instead of red as being more suitable for displaying fresh meats.

It is held that green offers a greater color contrast, and conveys the impression that meats are redder and fresher. In fact, old-time butchers had this idea when they garnished red meats with green sprigs of parsley.

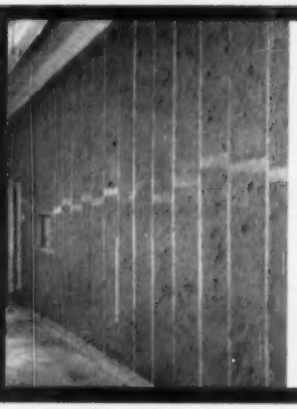
All our packaging materials now carry a yellow and light green checkerboard design, along with dark green lettering (or yellow lettering on dark green background).

Further, carcasses are attractively packaged in color-printed, brand-identifiable polyethylene bags (1½ mil thick). The more sanitary polyethylene bags prevent contamination of carcasses. Also, we've found that this bagging takes less time than the former routine of packaging in brown kraft paper.

Big super market chain switches to Void Free PALCO WOOL

This Tustin, California unit is one of approximately 10 huge Market Basket Stores recently completed, in construction or planned for the near future—each with 7 freezer and cooler rooms insulated with Void Free *Palco Wool*.

Palco Wool is packed behind temporary retainer sheets which are moved up as fill progresses, leaving entire wall open for inspection to eliminate any possibility of voids.



Resilient, self-supporting *Palco Wool* remains in place throughout entire wall, allowing full inspection before interior finish is applied. This is one of 7 cooler and freezer rooms at the Market Basket in Tustin, Calif.

5 newest markets and 5 more scheduled with Void Free PALCO WOOL Insulation in over 70 large freezer and cooler rooms

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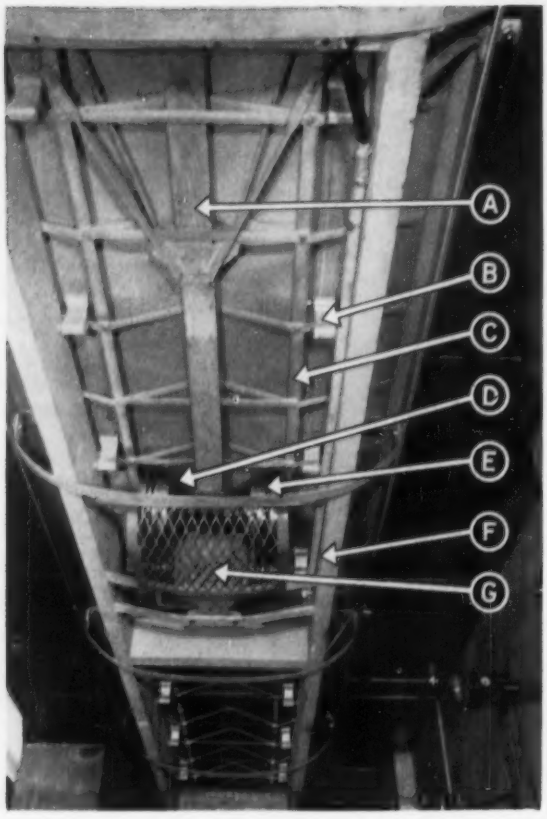
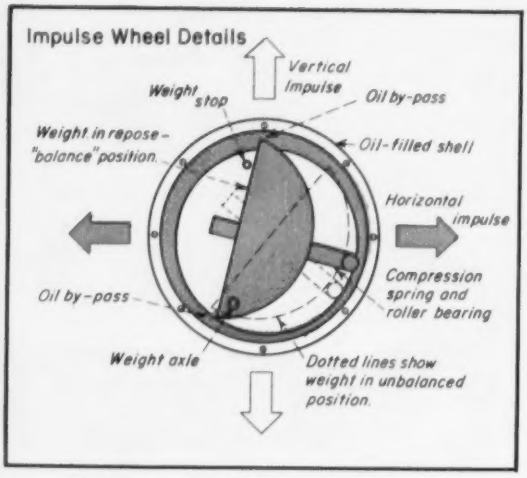




UNIQUE VIBRATOR: Centrifugal force of rotating impulse wheel throws pivoted weight out of balance (as shown by dotted lines) to produce the vibration. Gradual displacement of oil (through bypasses) acts as shock absorber when conveyor starts or stops.

LIGHT-METAL DESIGN of conveyor's table top and unit's major operating components are evident in view from below (bottom aluminum cover removed). (A) shows maple flexure, 1x4 in.; (B) suspension arm with rubber bushings; (C) conveyor frame; (D) suspension spring; (E) impulse-wheel assembly; (F) support frame; (G) motor, 1 hp., 3,400 rpm., double-shaft drive.

Line performance reveals merits of

Revolutionary Vibrating Conveyor

Prime feature of new engineering concept is the vibrator design, which provides gentle yet effective propulsion. Sanitary equipment has further application as cooling unit, inspection table, and filler

E. F. BOUSCHOR and C. R. HAVIGHORST

Respectively, Plant Manager, Blue Bell Potato Chip Co., Portland, Ore., and Senior Associate Editor, "Food Engineering"

VIBRATING CONVEYORS have come a long way from their first crude beginnings. Nevertheless, the door remains open for newer models –and for striking, radically different units, as well.

In fact, a revolutionary machine has recently demonstrated some significant advantages for food processors in its first commercial application. This installation is at Blue Bell Potato Chip Co., Portland, Ore., which reports that the new equipment assures–

1. Maintenance savings that are expected to pay for the equipment in less than two years.

2. Gentle handling of fragile items.

3. Silent operation with no transmission of annoying vibrations to operators.

4. Versatility (being used as a cooling unit).

5. Ease of adjustment for varying product flow.

6. High sanitation, with easy cleaning of the unit using mild laundry soap.

Handling of potato chips was the opener. Today, the conveyor is also proving itself in size-grading and washing of various fruits and vegetables, also in freezing plants where

it doubles as an inspection table and filler.

Furthermore, there is now under test a cascading-type modification of this conveyor. It is equipped with infra-red lamps and has been used successfully in heat-processing of foods, such as peanuts.

Now down to details of construction and operation of the basic unit:

Made in Sections

Conveyor surfaces are in sections (see lead illustrations) most of them 42-in. wide, 24-ft. long, and with 3-in. coved sides. Made of single sheets of 0.064, 61ST anodized aluminum (Reynolds), they are framed to provide rigidity and strength.

Sections are separately suspended by spring-loaded rods fixed to 4x4 in. beams atop ceiling joists. A series of adjustable rubber-cushioned suspension arms connect the conveyor frame to a steel-beam frame, which supports the motors. These arms act to control the conveyor's horizontal-vertical amplitudes.

Each conveyor section is independently equipped with vibratory mechanism and motor. Sections are sloped slightly, which permits overlapping them for continuous product flow.

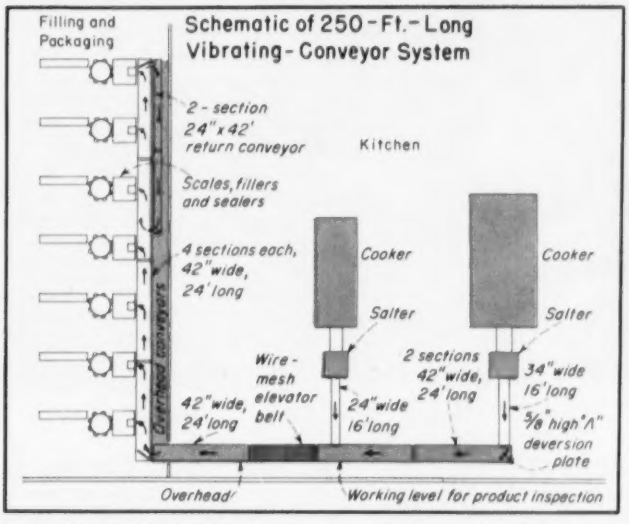
Blue Bell expects this system to pay for itself inside 24 months by minimizing maintenance. The company sees these savings won due to the simpler, long-wearing aluminum construction of the conveying surface employed.

Vibrator—A New Concept

Key to efficient operation of this conveyor is its unique vibrator design. Here is the operating principle according to the company credited with its invention, Allen-Harper Inc., Newberg, Ore.:

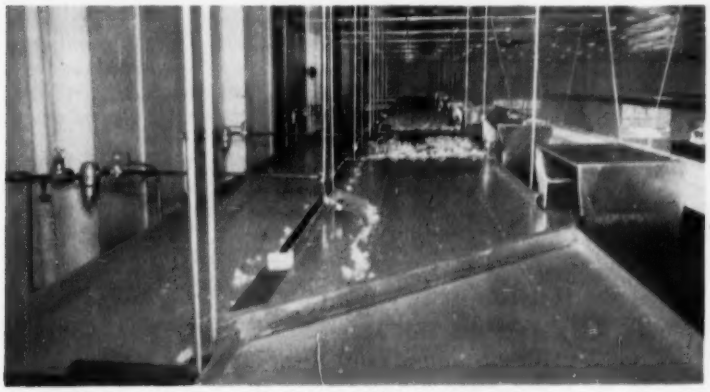
As shown in the lead illustrations, the vibrator (impulse wheel assem-

Conveyor Installation . . . Unit Closeups

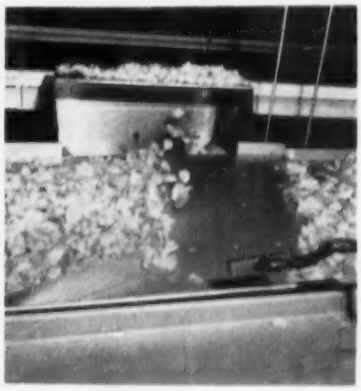


LAYOUT OF CARRIERS in potato-chip plant shows their dimensions.

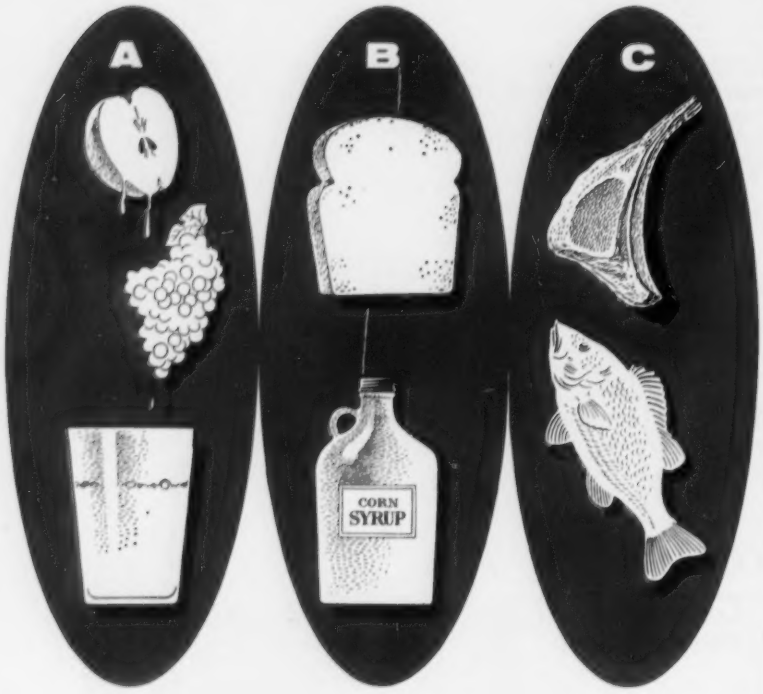
COOKED CHIPS are cooled and checked on this 48-ft. component. Inclined belt (background) discharges them to overhead leg of system.



CARRIER then feeds upper-level hoppers (right) that supply seven weighing and filling machines (located on floor below). Table tops are supported by spring-loaded rods. Return conveyor (left) handles any product overflow. Valve systems (seen here against the left wall) deliver filtered air to a series of seven . . .



. . . **JETS**, like this one, which gently blow chips, as needed, into corresponding hoppers. Action is controlled by sensitive switches.



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Rohm & Haas commercial enzymes are all natural products . . . and among the most effective aids in food processing.

They are easy to use and are well suited to the mild processing conditions common to the food industry. In service they provide many benefits. For example, they clarify fruit juices, tenderize meats, aid in the production of pre-cooked breakfast cereals, improve the texture of bread, and reduce the viscosity of chocolate sirups.

Rohm & Haas enzymes catalyze specific reactions; unwanted by-products are not formed. And little enzyme goes a long way toward increased production efficiency and greater consumer sales appeal.

Write to Department SP outlining your food processing problem.

A PECTINASE: fruit juices, concentrates, wines

B DIASTASE: bread, cereal-derived products, corn sirup

C PROTEASE: meat, fish, beer

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bly) is suspended from the conveyor frame by two steel springs and a resilient maple stave (flexure). They are attached to the vibrator at its common axle bearing.

An assembly consists of two identical hollow wheels (drawing, p. 82) mounted on a journal. Each wheel is oil-filled and contains a crescent-shaped movable weight that is pivoted on an axle near the inner periphery of the wheel.

When in repose, a weight is held in a near-balanced position, against stops, by compression springs. Latter are enclosed in telescoping casings that extend through centers of the weights. Casings are tipped with ball bearings which, when weights move, roll on the wheel's inner walls. Wheels and weights are balanced for uniform vibration.

When the conveyor is started, wheels are essentially in balance. Then as they gather speed, centrifugal force throws them out of balance, thus compressing the springs. This action gradually displaces the oil from one side of the shell to the other through two restricted bypasses. Gradual displacement of oil acts as a weight snubber, allowing weights to move in and out of operating position without shock.

This feature obviates violent initial or terminal vibrations when unit is started or stopped.

At top speed (800-900 rpm.), the imbalanced wheel is eccentric and thus provides the required vibrating action.

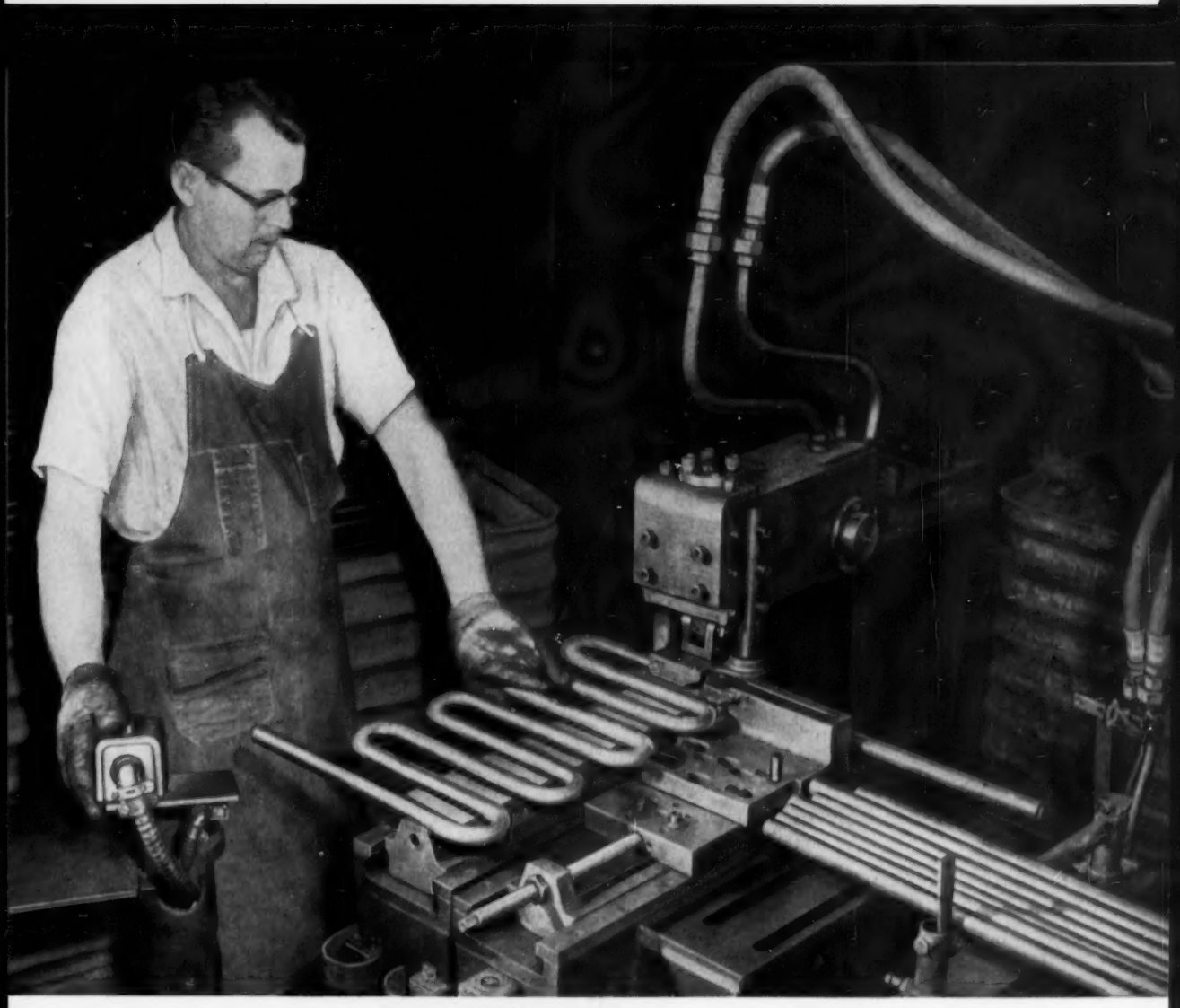
Conveyor Amplitude

Horizontal amplitude, which is of principal concern, is determined by the weight ratio of impulse wheels to conveyor surface and frame. Vertical amplitude is controlled by adjusting the angle of the support arms. The combination of the flexure and impulse wheel acts as a motion filter, wasting undesirable vertical motions, but transmitting the desirable horizontal ones.

Tests on items conveyed to date indicate that product load has little effect on the amplitude of the conveyor.

The angle of the arms may be changed on any conveyor section by adjusting the lever, which is locked to a calibrated tangent by a handwheel.

A full reciprocal stroke, or single vibration, transmitted by the vibrator to the conveyor surface is estimated to be not more than ¼ in. It is described as a wave-like motion,



A REFRIGERATOR, TOO, CAN BE THE STRONG, SILENT TYPE

One home refrigerator with a reputation for silence and long service life depends upon B&W for "the type of tubing necessary to the efficient operation of the refrigerator. Without it, the refrigerator could not provide the required performance. It must last the life of the unit."

To meet that tough specification for evaporator coils and high temperature coils, B&W supplies Electric-Resistance-Welded Tubing with precision-made serrations on the I.D. Rockwell hardness must be held within close tolerances, and the seam-weld must withstand 1,000 pounds pressure—no interior surface copper is permitted.

For special applications like this, get in touch with Mr. Tubes, whose specialty is matching tubes to jobs to save you time and money. For many Electric-Resistance-Welded tubing requirements, you'll find that your nearby B&W distributor maintains comprehensive stocks to meet your needs. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.

Seamless and welded tubular products, seamless welding fittings and forged steel flanges in carbon, alloy and stainless steels

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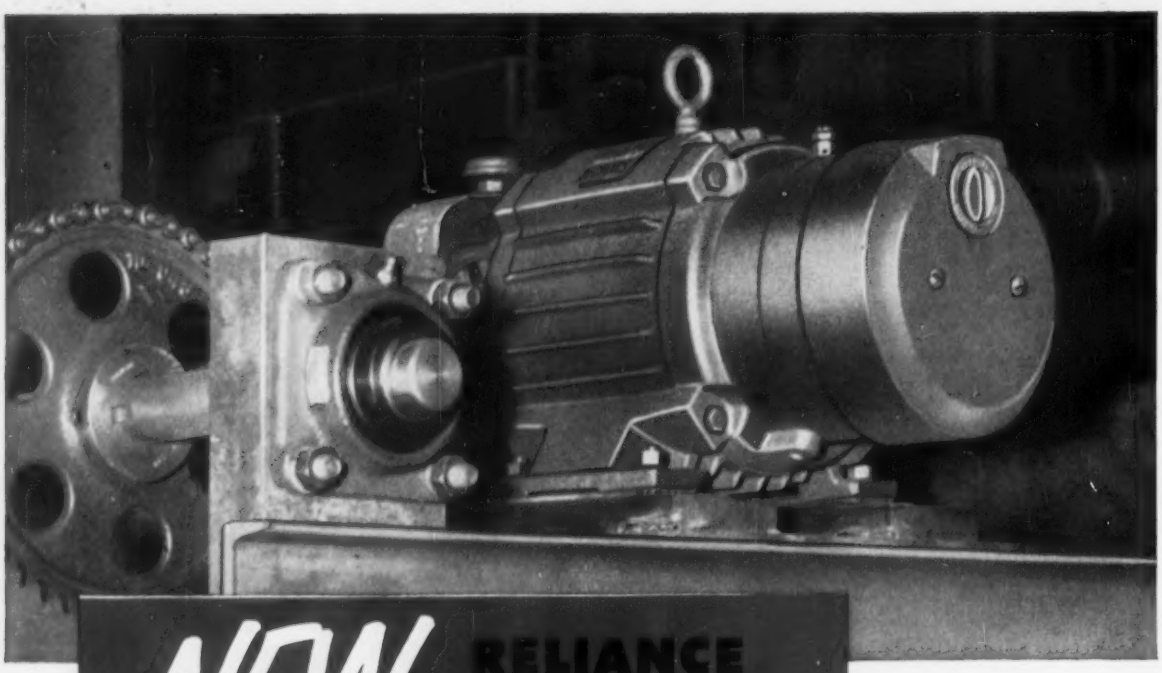

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These new motors are specifically designed for tough operating conditions. Corrosion-proof cast-iron housings and sealed joints make this motor impregnable to foreign material.

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Simple brake has only six parts and requires no control wiring or auxiliary electrical equipment. Compact construction requires a minimum of space. Wearing parts are easily accessible for fast maintenance.

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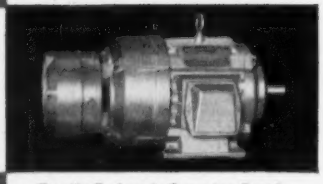

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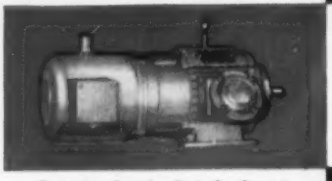
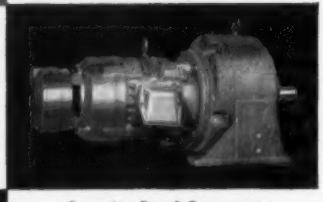
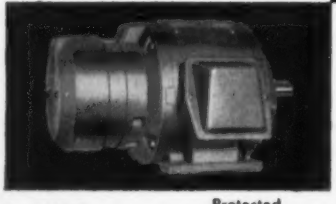


Explosion-Proof—Cl. I, Gr. D and Cl. II, Grs. E, F & G



Corrosion-Proof Gearmotor



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with the conveyor's action bumping the product upward at the wave's crest, then impelling it forward as when in the trough. So frequent are these vibrations that the product seems to be moving forward in mid-air.

Berry Application

This conveyor's action has proved sufficiently gentle to be used as an inspection table and filler for fragile red raspberries and other cane berries. Such units are designed with curved sections of aluminum that extend upward from the bottom cover and form nonvibrating rails. Inspectors can rest their arms on these rails without being annoyed by vibrations.

At their discharge ends, berry conveyors are divided into chutes, which in turn discharge berries into containers. The latter ride up into receiving position on a carton conveyor running underneath. After containers are filled, the conveyor is re-started to move filled cartons out, and empty ones into the filling area.

Experimental Model

Another unit, now under test, is a 5-tiered conveyor having metal flexures. Here, tiers are arranged so that product cascades from the upper to lower levels. This unit, equipped with infra-red lamps, has been used in heat-processing applications, such as roasting of peanuts.

• • •

Stops Foaming, Boosts Output

Messy, production-disrupting spillage is eliminated by new antifoam agent

RICHARD HAZLETT
Sydney Clayton & Associates, Chicago

EXCESSIVE FOAMING of a unit in your processing line can mean multiple trouble—loss of material and jammed up production, as well as a mess calling for extra maintenance and sanitation.

It meant exactly that at Produce Packers, Inc., Chicago, which cleans, peels, slices, and bags 30,000 lb. of potatoes daily for the restaurant trade.

In fact the flood of froth from this company's lye peeler finally disrupted the whole operation. And it defied solution because no stock compound would control it.

That is, it did until chemical engineers tackled the case as a special problem and came up with a new antifoam agent.

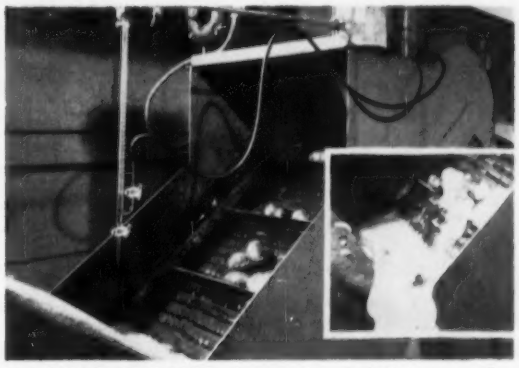
"Using the new compound," says Company Manager Goodman, "our peeler now works without a hitch (see photo). Foaming is completely controlled."

Ends Lye-Peeler Foam

Here skins of the potatoes are loosened in the tank's 20% caustic solution. This liquid is kept in constant motion to move the tubers along. And thus agitated, it "worked on" impurities in the peels.

Result was excess foam spilling over the sides, causing loss of caustic and thus imperfect peeling. Further, this spillage was a safety hazard as well as a maintenance and sanitation problem. The foam even impeded the flow of potatoes and sometimes halted operations entirely.

In looking for a remedy, the company called on Hodag Chemical Corp., producer of antifoam agents.



NO MORE BILLOWS of foam (inset) sloshing over the sides of this lye peeler, to waste caustic and hobble the processing operation! Regular drip of new antifoam agent from delivery tube (fed from reservoir, top) quickly remedies exasperating problem.

As stated, there was no stock product to meet the situation.

But Hodag engineers were equal to the challenge. They formulated a brand new compound to do the job.

Details of Agent

Called F-20, the new pale straw-colored, bland-odored agent is based on specially fractionated edible vegetable oils. It's heat treated to kill any bacteria. Weight is 7½ lb. per gallon, and being a free-flowing liquid it's easily applied either manually or automatically. Further, it's non-corrosive, hence can be handled in plain iron equipment.

Continued Mr. Goodman: "We constantly apply this antifoam to our tank by means of a drip apparatus—direct, without need for any heating. We can closely regulate the drip, and there's no clogging of the nozzle. Our experience shows the agent to be effective even in small concentrations, and it remains stable over long storage.

"We use a pint a day. And cost is only about 7¢ per ton of potatoes processed—which is much more than made up by increased production and maintenance savings."

TESTS were conducted on 107 orange beverages in the effort to establish more accurate pH yardsticks.

Actually, studies now show that ingredients other than acids greatly influence pH readings, thus minimizing their value . . . Here are tips on how you can resolve these differences when testing

Just How Reliable Is pH As a Guide to Food Acidity?

A. W. NOLING and JOHN H. O'BRIEN
Respectively, President and Chief Chemist,
Hurty-Peck & Co., Indianapolis

WHILE pH is a convenient scale for checking the acidity of food products, it must be interpreted properly or the results will confuse rather than inform.

This is particularly true with foods such as ice cream, ices, baked goods, syrups, dessert powders, and beverages, where effect of acidity on the human palate is of paramount importance.

In these instances, the amount of acid used and its control must be carefully established. And here there appears to be no substiute for taste when testing.

Once the satisfactory intensity and type of acid, and proper balance of all other ingredients have been established, however, a pH standard can be set up and each subsequent run can be easily and quickly checked against it.

Beverage Studies Pinpoint Problems

These conclusions were reached in an analysis of 107 different orange beverages submitted to us for laboratory examination, followed by additional tests on skeleton drinks.

In the case of the orange drinks, there was hope for some pattern that would indicate the use of pH as a reasonably accurate standard. Groups were selected on the basis of having the same pH, Brix, carbonation, or total acidity. But no semblance of a constant emerged from the test drinks.

However, we gained the impression that pH was the figure most influenced by the other ingredients of the beverages. So we set up a number of tests to further investigate the usefulness of pH as a guide to acidity of soft drinks.

Specific Ingredients Checked

From these we obtained information relating to many factors (other than lack of constant quality of ingredients) than can cause a change in pH or acidity of a beverage. Here are some of them:

Water. Presence of CO_2 from the atmosphere, as well as total alkalinity, has a definite bearing on pH of soft drinks.

This was demonstrated when a sample of cold municipal water (Indianapolis) was warmed to room temperature and agitated. The original 7.4 pH changed to 8.65. When the water was exposed undisturbed to the air for 5 hr. the pH changed to 8.1.

It had apparently reabsorbed some CO_2 from the air.

Then an experiment was run with commercial distilled water having an initial pH of 5.9. After agitation, as in the case of the tap water, the pH was 6.8. After waiting 5 hr. a pH of 6.6 was obtained.

It is appreciated that pH changes ranging from 6 to 8—or in many cases from 5 to 9—are of little consequence in most commercial products. However, the foregoing variations indicate that in light acid solutions confusing results may be expected.

Sugar and Syrup. Cane sugar and simple syrup made with it seem to have little effect on the pH of an average drink. This was demonstrated when an 8.0 pH water was used to make 32 deg. Baume syrup which had a 7.7 pH. When, for a drink, this syrup was diluted by six times, three times, and two times, using the original 8.0 pH water, practically no change took place.

When distilled water was used to make the syrup, the pH changed from the original 6.4 to 6.9 pH. The pH showed little change also when diluted to various drink strengths.

Carbon Dioxide. Because of natural effervescence and resulting quick release of gas from a carbonated beverage, tests for pH and total acidity when the gas is present in large quantity are of questionable accuracy. The major problem, is one of being sure the added gas is all that is removed.

The usual "quick and easy" method is to "knock" off the gas with violent agitation. This appears to give erratic pH results, and in all cases to reduce total acidity below the true figure as obtained from a still drink (see Table I).

Comparative tests indicate that an alternate method such as gentle stirring in a warm water bath will give more accurate results. Time should be allowed for the beverage to return to normal test temperature and to re-absorb the natural CO_2. With either method, several hours standing will increase the accuracy of final results.

Amount of Acid Used. In the case of highly concentrated acid solutions, pH comparisons are not very reliable. As an example, solutions containing 4 lb. of citric acid in enough water to make a gallon show a 0.65 pH whether made with tap water of 7.1 or distilled water of 6.4 pH. However, the tap water solution when titrated will show a total acidity of 404.48 grams per liter while the distilled water solution will show 414.42 g./l. This is a difference of 3½% in actual acid, and it might be recognized in some products.

Table II shows the difference in the pH of the drink when adding varying quantities of acid solution to tap water of 7.6 pH and distilled water of 6.25 pH.

Type of Acid. While citric acid is used with most flavors, both phosphoric and tartaric have their places. Phosphoric is accepted for cola drinks and is used sometimes in a grape drink to balance the flavor, Tartaric had been used with grape drinks but has been largely supplanted in recent years by citric. When

Factors That Influence pH Readings

TABLE I—IMPROPER REMOVAL OF GAS From Carbonated Drink Gives Incorrect pH Readings. (Tests Made on Orange Beverages, Still and Carbonated)

	Still		Carbonated	
Beverage	pH	Total Acidity*	pH	Total Acidity*
Average sugar and acid of non-juice citrus beverage	3.3	1.17	3.3	1.03
Another sample as above	3.0	1.20	3.2	1.075
Orange drink, low juice	3.0	1.69	3.3	1.30
Orange drink, 6% juice	3.3	1.80	3.3	1.66
Orange drink, 6% juice plus buffer (sodium citrate)	3.4	1.83	3.2	1.075
Average sugar, acid and buffer of juice type citrus beverage	3.2	1.18	3.2	1.01

*Grams per liter of citric acid.

TABLE II—WHEN SMALL AMOUNTS OF ACID Are Added, Acidity of Water Influences ph of Finished Drink

Amount of Solution Used to 7 oz. Drink*	Total Acidity Grams/Liter	pH With Tap Water	pH With Distilled Water
2½ minims	.355	4.5	3.2
5 minims	.71	3.6	2.9
10 minims	1.42	3.1	2.6
20 minims	2.84	2.8	2.5

*Acid solution made by dissolving 4 lb. citric acid hydrous in enough water to make a gallon.

TABLE III—ACID AND BRIX OF DRINK Increase Rapidly With Increase in Amount of Juice. But Due to Buffer Action of the Juice, pH Changes Very Slowly

Percent Juice By Volume	pH	Total Acidity Grams/Liters	Acid Percent	Brix
Base (no juice)*	3.05	1.30	.117	14½
5	3.10	1.92	.171	15½
10	3.20	2.355	.209	16¼
15	3.30	2.88	.254	17
20	3.40	3.38	.297	17½
25	3.50	3.89	.340	18
100	3.65	9.62	.878	12½

*Base product, 7 oz. drink with 1½ oz 32 deg. Baume sugar syrup and 2 oz. of 4-lb. citric acid solution to each gallon of syrup. Drinks were made with a tap water, 7.5 pH. Juice was concentrated orange containing 2/10% benzoate of soda.

TABLE IV—WHEN BENZOATE OF SODA Is Present, Only Titration Gives Reliable Acid Content

Percent Benzoate By Volume	pH	Brix	Total Acidity
0 (Distilled water)	2.8	12	1.152
1/80th (Distilled water)	2.9	12	1.152
1/40th (Distilled water)	3.0	12	1.152
1/20th (Distilled water)	3.3	12	1.152
1/10th (Distilled water)	3.7	12	1.152
1/5th (Distilled water)	4.1	12	1.152
0 (Tap water)	3.1	12	1.12
1/10th (Tap water)	3.3	12	1.12

CHARACTERISTICS OF DIFFERENT-FLAVOR DRINKS

Figures represent averages for entire country and must be modified for various sections, as well as for a wide range within sections.

Flavor	pH	Total Acidity G./1.	Percent Acid	Brix	Volumes CO_2
Birch beer	4.0	.15	.0138	11½	2.5
Cream soda	4.0	.15	.0138	12½	2.5
Cherry	2.8	1.15	.106	11½	2.5
Cola.....	2.2	1.40*	.130*	10	3.5
Ginger ale, pale dry	2.7	1.40	.131	9	3 & 4
Ginger ale, golden	3.1	1.10	.101	11½	2.5
Grape	3.0	1.20	.109	13½	1.6
Grapefruit	2.9	3.00	.278	10½	3.0
Lemonade	3.0	2.50	.229	12	1.0
Lemon soda	3.4	1.15	.107	10	2.5
Lemon & lime (7 Up type)	3.4	1.15	.107	10	3.5
Lemon sour	3.0	4.00	.375	9	2.5
Lime rickey	2.8	3.00	.282	8½	2.9
Orange soda (juice type)	3.3	1.55	.139	14½	1.2
Orange drink (juice type) still	2.9	3.65	.333	12½	0.0
Orange soda (oil type)	3.1	1.50	.136	13½	1.5
Peach	2.8	1.15	.106	11½	2.0
Quinine water	2.5	3.75	.350	9½	3.0
Root Beer	4.0	.15	.0138	11	2.7
Sarsaparilla	4.0	.15	.0138	11	3.2
Strawberry	3.1	.90	.083	12	2.7

*Figured as phosphoric acid 50%.

employed in the same concentration, each of these acids shows a different pH:

Acid	pH	Total Acidity g./l.
Citric	3.25	1.026
Tartaric	2.9	1.125
Phosphoric 50%	2.1	3.37

While the figures for citric and tartaric follow the same general pattern, it will be noted that phosphoric, with its very low pH and moderate total acidity, discloses its own presence.

Type of Beverage. The so-called sweet drinks, such as cream soda and root beer, will generally have a high pH and low acidity. These are termed "sweet" not so much for high sugar content as for lower acidity and lower CO_2. Other drinks, such as ginger ale and sours show the reverse figures, with a lower pH and higher acidity. These are sometimes low in sugar and high in gas.

Juice and buffer content, type of acid, amount of acid, and preservative content all contribute to the final pH and total acidity of a beverage.

Flavor and Color. When a non-juice, non-benzoated flavor, or color, are added to sugar and water, the pH will seldom be changed from the so-called neutral zone of 6.0 to 8.0:

Flavor	pH
Cola	6.5
Ginger ale	7.5
Grape	6.9
Lemon and lime	7.6
Orange	7.5
Root beer	6.6

The three flavors that run below 7.0 contain varying amounts of burnt sugar coloring.

Juice Content. Many beverages contain juice of one type or another which will have some effect on the pH. Orange juice, the most widely used one, is generally concentrated by the original processor and diluted back to single strength by the bottler. Most juices also contain a preservative, usually benzoate of soda. The pH of the beverage will be affected by the usual alkalizing influence of these two factors. But these factors are not entirely responsible for the pH change that takes place.

Natural buffers in the juice keep the pH of the beverage relatively constant so that such figures give no real indication of the amount of juice or acid content of the drink. In the face of this complication, titration for g./1. or percent of acid is the only satisfactory guide (see Table III).

In another experiment dealing with 6% orange juice in beverages made with distilled water of 6.2 pH versus tap water with 7.5 pH, total acidity remained practically constant (1.80 g./l. anhydrous citric for tap water and 1.79 for distilled). The pH, however, showed the usual major change from 3.3 for tap water to 3.0 for distilled

Buffers. In some beverages, various type salts are included as ingredients. Simple ones such as sodium chloride are used to bring out the flavor. Salts such as sodium citrate are used to buffer the action of the highly concentrated acid content in the flavor base.

Salts such as carbonates are used in bottled sparkling water to aid effervescence. Many lemon and lime type drinks now use salts of the citrate type to help retain freshness of the flavor. In all cases these salts are alkaline and will raise the pH of the beverage or the water.

To determine the effect of sodium citrate, a number of tests were made. A standard 32 deg. Baume syrup containing 2 oz. of a 4 lb. citric acid solution were used at the rate of 1¼ oz. to the 7 oz. bottle. Sodium citrate (1½ grain) was added to one bottle, changing its pH from 3.0 to 3.2. Acidity remained at 1.2g./1. With distilled water, the pH changed from 2.6 to 2.8 while the acidity remained constant. When 6% orange juice was introduced to the above drink results were similar.

Several examples of high pH in sparkling water were noted, the values running 8.7-9.0. Tests on lemon and lime drinks that were known to contain sodium citrate, showed a pH of 3.4 with a total acidity of about 1.00 g./1. This can be contrasted with a base drink, containing the same sugar and acid but without the flavor or salts, which shows a 3.1 pH.

Preservative. In order to study effect of preservatives on pH, benzoate of soda was selected. It was found that a considerable change took place even as small an amount as 1/80%. When the usual amounts (1/10 or 1/5%) commonly used in concentrated juice were added, such a change took place that only titration would give a useful figure for the acid content (see Table IV).

Substitute Sweeteners. Saccharin and cyclamates, the

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Heyden Chemical Corporation, a leading producer of organic chemicals for over half a century—pioneer in the commercial production of such important chemicals as formaldehyde, salicylates, benzoates, pentaerythritols and many others—now combines the forces and facilities of *Newport Industries, Inc.*, a major producer of naval stores, tall oil fatty acids and rosins, and well-known manufacturer of fine chemicals derived from wood.

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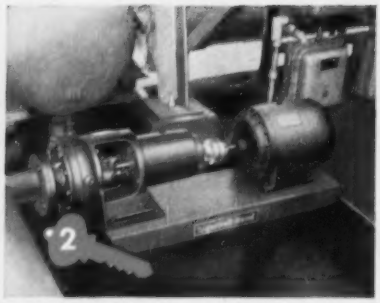

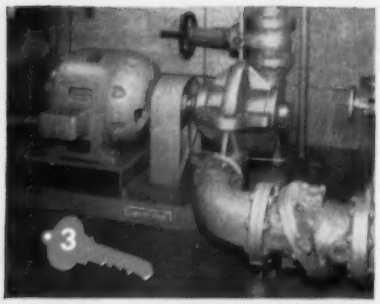

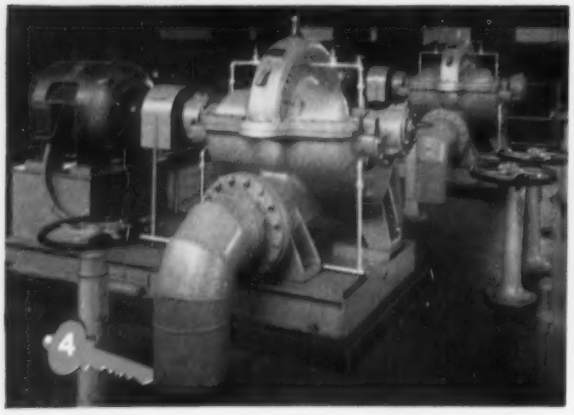

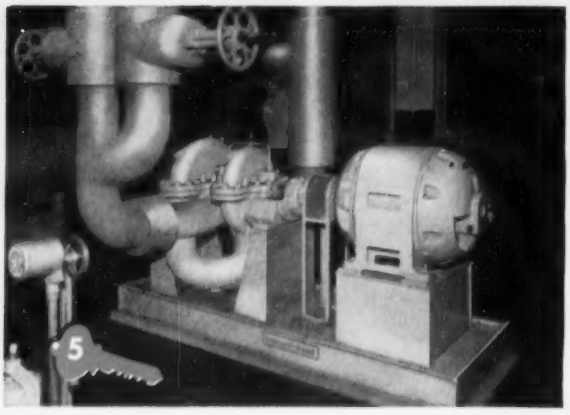

Five Keys to LONG-RANGE ECONOMY on your general-purpose pumping jobs

The Ingersoll-Rand pumps shown feature several different designs and types. Yet they all have one thing in common—the ability to give you low-cost performance on your general purpose pumping jobs.

When you install an I-R pump, you can count on continued efficient operation—with a minimum of time out for attention and maintenance.

In addition to the pumps shown, Ingersoll-Rand manufactures a complete line of single and multi-stage pumps of horizontal and vertical design for every job application. See your I-R representative for full information on the pump which best meets your needs.

1. MOTORPUMPS: Free from base plates, couplings and alignment problems, I-R Motorpumps can be mounted in any position that gives the simplest, most economical installation. They are especially designed for continuous full load service, with a wide range of capacities from 5 to 1800 gpm and heads up to 600 ft. Available in single, two and four-stage units.

2. CRADLE-MOUNTED PUMPS: Built with separate pump and drive units, coupled and mounted on a sturdy base plate, I-R Cradle-Mounted Pumps come in one and two stages, with capacities from 5 to 2800 gpm and heads up to 525 ft. They can be equipped with any drive, and provide easier accessibility, over-sized bearings and greater accessibility.

3. SINGLE-STAGE HORIZONTALLY-SPLIT PUMPS, with double mechanical shaft seals: For capacities from 275 to 2400 gpm and heads to 350 ft., maintenance-free DMV and DHV pumps are provided with double mechanical shaft-seals and permanently lubricated sealed bearings. Troublesome stuffing box maintenance is eliminated, and bearings do not require any attention or lubrication throughout the life of the pump.

4. SINGLE-STAGE HORIZONTALLY-SPLIT PUMPS, conventional design: The Class AFV unit illustrated is typical of the standard I-R line of single-stage horizontally-split centrifugals, with capacities ranging from 25 to 50,000 gpm, and heads from 20 to 350 ft. Stuffing boxes are extra deep, and equipped with water seal cages. Any type of drive may be used.

5. TWO-STAGE HORIZONTALLY-SPLIT PUMPS: I-R two-stage Class GT pumps are available in capacities up to 2200 gpm for discharge heads up to 1050 ft. Outstanding performance is assured by such features as extra deep stuffing boxes, renewable shaft sleeves and wearing rings, carefully designed liquid passages and volutes, and efficient closed-type impellers.

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and cyclamates, the most commonly used sweeteners other than sugars, have little effect on the pH or acidity of the beverages in which they are used. With a base drink containing sugar and acid, and having a pH of 2.6 and a total acidity of 1.55 g./l., a saccharin drink of relative sweetness and acidity showed the same pH and an acidity of 1.523 g./l. This is also true of the cyclamate sweetened drink.

The above tests indicate that the pH reading, when compared with total acidity, does suggest presence of such ingredients as juice, buffer, benzoate, acids other than citric, and abnormal conditions (as spoilage).

When such indications show up, the need for more detailed tests becomes apparent. The pH then becomes a sort of barometer for detecting presence of specific influences when analyzing a beverage.

• • •

Engineering Licks Can Problems

Troubles plaguing efficiency of Coast plant's production line are solved by astute washer adaptation and new off-floor retort setup . . . Labor saved

RAY BLOOMBERG
FE Special Correspondent, Seattle, Wash.

AS PLANT OPERATORS know only too well, performance all down the line can be choked by just one snag in the production routine.

But at Hilton Sea Foods Co., Seattle, it wasn't just one snag hobbling efficiency. It was two.

No. 1 was in can washing—due to a factor in the company's specialty products (oyster stew, clam chowder, and the like) that caused trouble in the labeling operation when employing conventional can cleansing.

No. 2 lay in retorting of cans, where safe sanitation was menaced.

Both difficulties were eliminated, however, when Hilton introduced two mechanical innovations specifically designed for its process needs. And these not only cleared the snags but also reduced labor requirements.

Case of the Cans

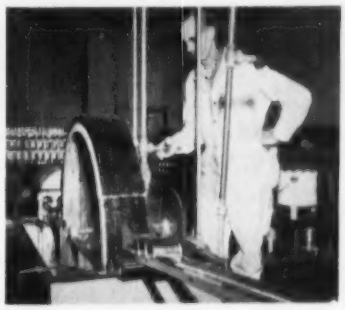
Stews and chowders contain both milk and butter—meaning that butterfat liquid often gets on the sides of cans at the filler. To provide a clean surface for effective labeling (good appearance, too), these cans must be washed. But simple spraying hadn't done the job. Only tedious scrubbing would do it.

Answer was an adaptation of a washer (Henry Peterson Mfg. Co., Portland, Ore.) used in regular fish canning. This unit consists of twelve sets of Nylon brushes, with bristles fixed in aluminum blocks mounted on an aluminum wheel.

This brush assembly is chain-driven, powered by a gear-head ½ hp. motor, and is mounted in a tank containing 30 gal. of 150F. water in which 32 oz. of detergent (Pyron) is mixed. Water is initially heated by steam-injection.

A hooded can-rinser, at discharge end of washer, provides 180F. make-up water to this tank from its overflow. Thus water is changed several times each shift. Proper water level in the tank is maintained by an overflow pipe, and detergent is added as needed.

Cans are carried through washer between the brushes and a spring-tensioned metal plate with guides shaped to the wheel. The brush turns the cans while scrubbing them. Two fixed brushes at bottom of arc scrub can ends as they pass. Space between brushes and curved plate adjusts from No. 210 to 414 size.



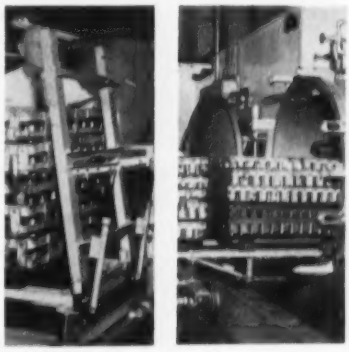
WHEN SIMPLE SPRAYING didn't get cans clean, Hilton put in this rotary-brush unit (hood removed for photo). It not only scrubs cans in a detergent solution but also keeps them moving to hooded spray-rinse (on other side).

Boom-Track Retort Feed

Now to the second problem: This plant is at low elevation on Puget Sound, and it developed that the sewers were quite close to ground surface. To remove all possibilities of contamination, the two retorts were raised above floor level.

This demanded that the tracks for the retort cars also be elevated—level with the retorts. But what of the gap between retorts and car tracks? A way had to be devised to bridge-track this gap to carry on retort operations—while leaving the space as a walkway at other times.

This was solved by designing a special draw-bridge type section of track and fitting it on a track-topped transfer car running on transverse rails in front of both retorts. When not in use, this boom-track section is held vertical by two spring-loaded rods and is locked by a draw-pin that fits in a hole made through one cylinder and its spring-loaded rod.



RAISING of retorts and car tracks above floor posed question of how to bridge gap between them. Answer was boom-track (left photo) on front of transverse-rolling transfer car. When dropped into retort lip (right) cars of cans are readily rolled in or out.

In operation, transfer car is rolled before a retort and its track locked to feed track. Next, retort door is opened, boom track lowered, and cans go in. Boom track is then lifted, retort door shut, and transfer car is rolled in front of other retort, where it repeats maneuver to remove cans from cooker. Car takes them to a third track, whereupon an electric hoist lifts them off for cooling.

1 **PRODUCTION** of whipped and patty potatoes starts with potatoes from this French fry line. Wire reel graders (left) separate the thin slices; multi-hole graders (one at arrow) sort out the shorties.

2 **PUMPS** shoot potato pieces from a collecting tank to byproducts processing room. Here, they are dewatered on wire-mesh belts and enter blanchers.

Creates Frozen Coproducts

Smart engineering turns potato slices and shorties into profitable whipped and patty foods

BY APPLYING imaginative engineering, raw materials once utilized in secondary items can be re-channeled into operations producing primary, profitable foods.

This is notably illustrated by the new frozen mashed potato and patty production at Birds Eye Div., General Foods Corp., plant in Caribou, Me. Here, pieces and whole potatoes recovered from the French fry line—are the raw materials.

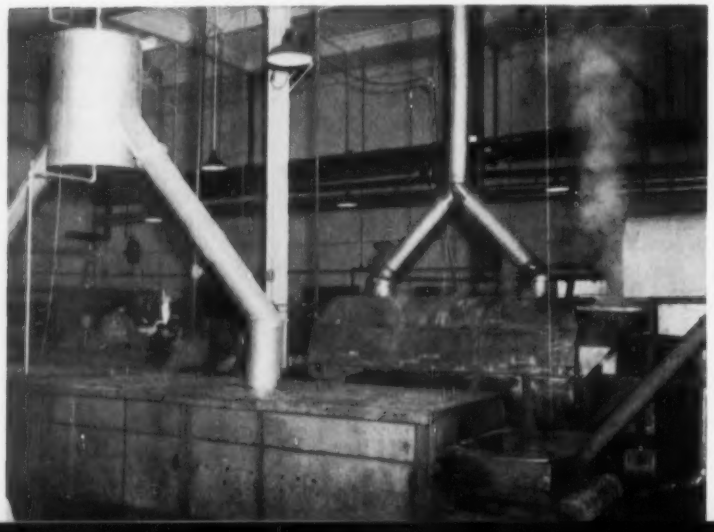
These formerly had gone to a starch factory. But today they're being used in front-running retail products—turned out at the rate of 3,000 lb. per hr.

This picture story shows how advanced line engineering brought about close-knit simultaneous operations, employing company-modified blanchers, grinders, and mixers.

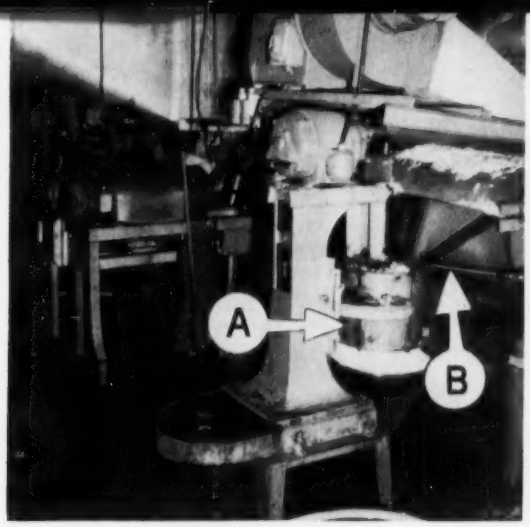
An unusual press-and-die comminutor and vibratory feeder, designed by company engineers, solves control of consistency and addition of flavors to mashed potatoes.

Close regulation of process is necessary to meet narrow specifications of both products. Therefore, blanching times are rigidly spotted to compensate for variations in potato solids (which fluctuate over a 6% spread), and the additional cooking time given products by the housewife.

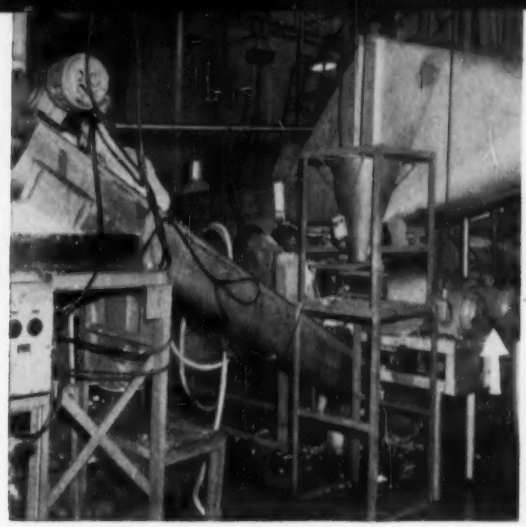
The comminutors are specially adapted to deliver a consistent, fine grind for mashed potatoes, and a coarser, chopped mix for the patties.



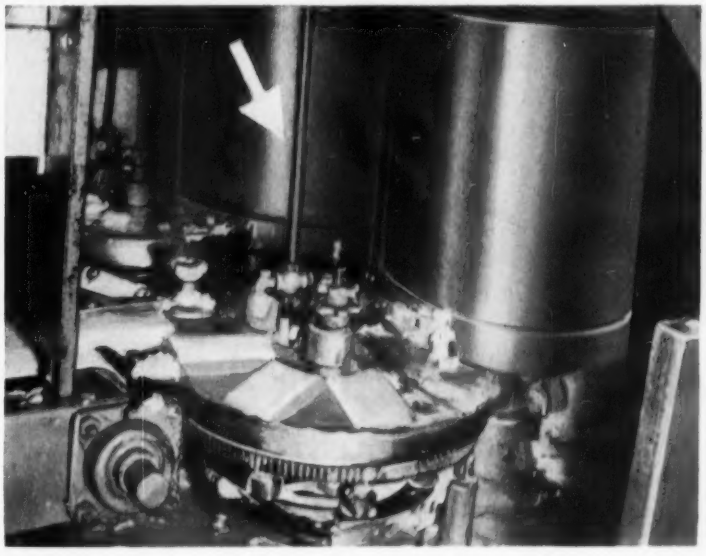
3 **STEAM BLANCHER** (foreground) was converted from a broccoli cooker. It's used for pre-cooking whipping potatoes. Tubers are subjected to steam (100 psi. line pressure), which is then condensed in tank above machine. Water curtain at blancher entrance also condenses steam and keeps it from escaping into the plant. Patty potatoes pass through standard hot water blancher (Robins) and are pre-cooked at 212F. Cooking times range 10 to 18 min., depending on solids content of potatoes.



4 **AFTER COOLING,** potatoes for whipping drop into company-made ricer (A). Here, they are forced through a fine die. Water, salt, and non-fat dry milk are added through a small pipe line (B). And a sanitary pump (Waukesha) impels the riced mixture to a filler.

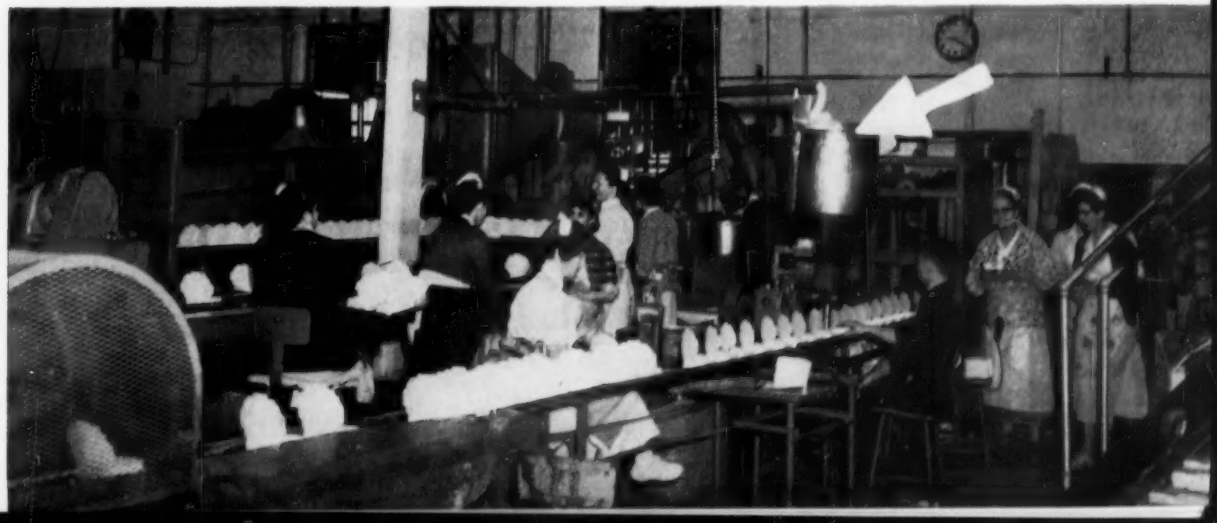


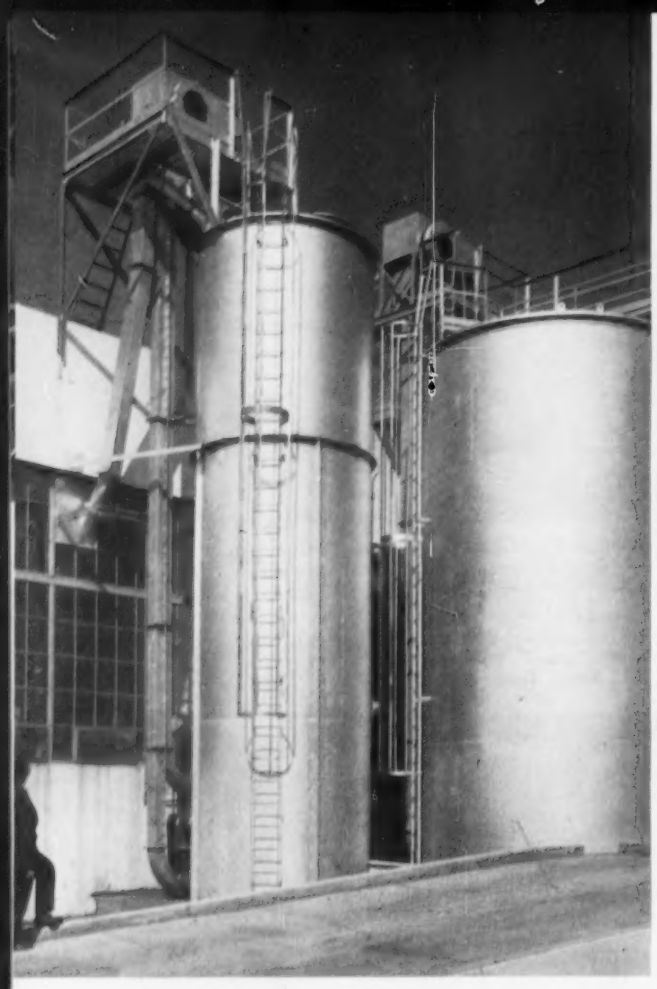
5 **PATTY POTATOES** are cooled below 80F. by a blast of refrigerated air, then fall into two choppers (arrow). These are units converted by GF engineers. Coarsely ground tubers pass into the inclined screw conveyor, where salt and onion powder are added from vibratory feeder.

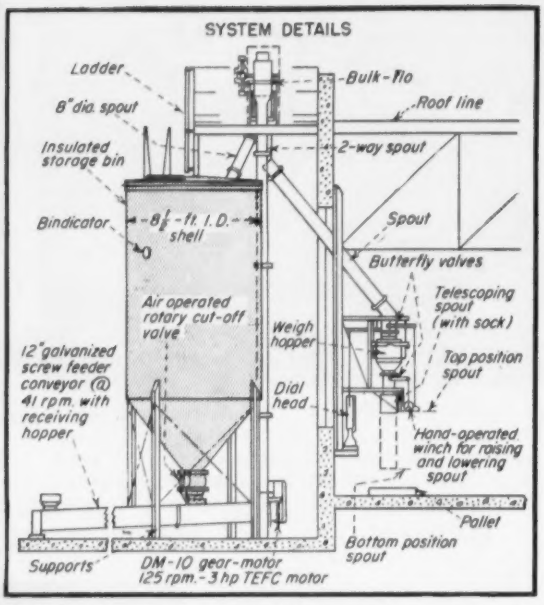


6 **PATTY FORMERS** are a design employed in the candy field (Automatic Food Shaping Mach'y Co.). The only modification is a stream of water (arrow) that keeps formed potato product from sticking in the molds.

7 **PACKAGING SECTION** includes (arrow) a volumetric piston filler (Filler Machine Co.) that meters mashed potatoes into cellophane-lined cartons at 1,000 lb. per hr. Patties are boxed at 2,000 lb./hr. (four to a carton, with wax paper separating the two layers). Both products are overwrapped (on Battle Creek machines) before freezing.







BULK SUGAR is trailer-trucked to spanking-new Tuxedo candy plant (left), where it is efficiently handled for direct feed to processes. Sugar passes right from trucks into screw conveyors for delivery to loop-type conveyor-elevators hooked up to each storage bin. Left bin holds cane sugar and has a 1,150-cu. ft. capacity. Right bin takes 3,000 cu. ft. If desired, sugar can be discharged from conveyor-elevators into plant instead of storage bins. Also, sugar in each bin can be re-cycled as may be required to prevent caking. Drawing (above) shows details.

Automatic Bulk Handling Boosts Efficiency and Quality

JOHN V. ZIEMBA
Associate Editor, "Food Engineering"

System that self-feeds, stores, and self-discharges sugar wins multiple benefits for West Coast candy plant. It is sanitary, contamination-free, and vapor-tight

BIG ADVANTAGE of course, in adoption of a system for bulk handling of sugar is cutting costs. The user gains buying economies.

What's more, manpower is more efficiently used. For bulk handling of sugar permits automatic loading and unloading. It also eliminates packaging and unpackaging.

While big savings were significant to Tuxedo Candy Co. (parent company, Safeway Stores, Inc.), the quality control features of this efficient handling system were paramount.

Sought by this quality-conscious firm was a contamination-free system of receiving and handling sugar in bulk. Yet the system had to be flexible and designed so that sugar could be recycled at will to prevent caking.

The new modern candy plant at San Jose, Calif., was designed for a 100,000-lb. daily output. Continuous-flow process was built around a battery of advanced candymaking machines in a 189,000-sq. ft. area.

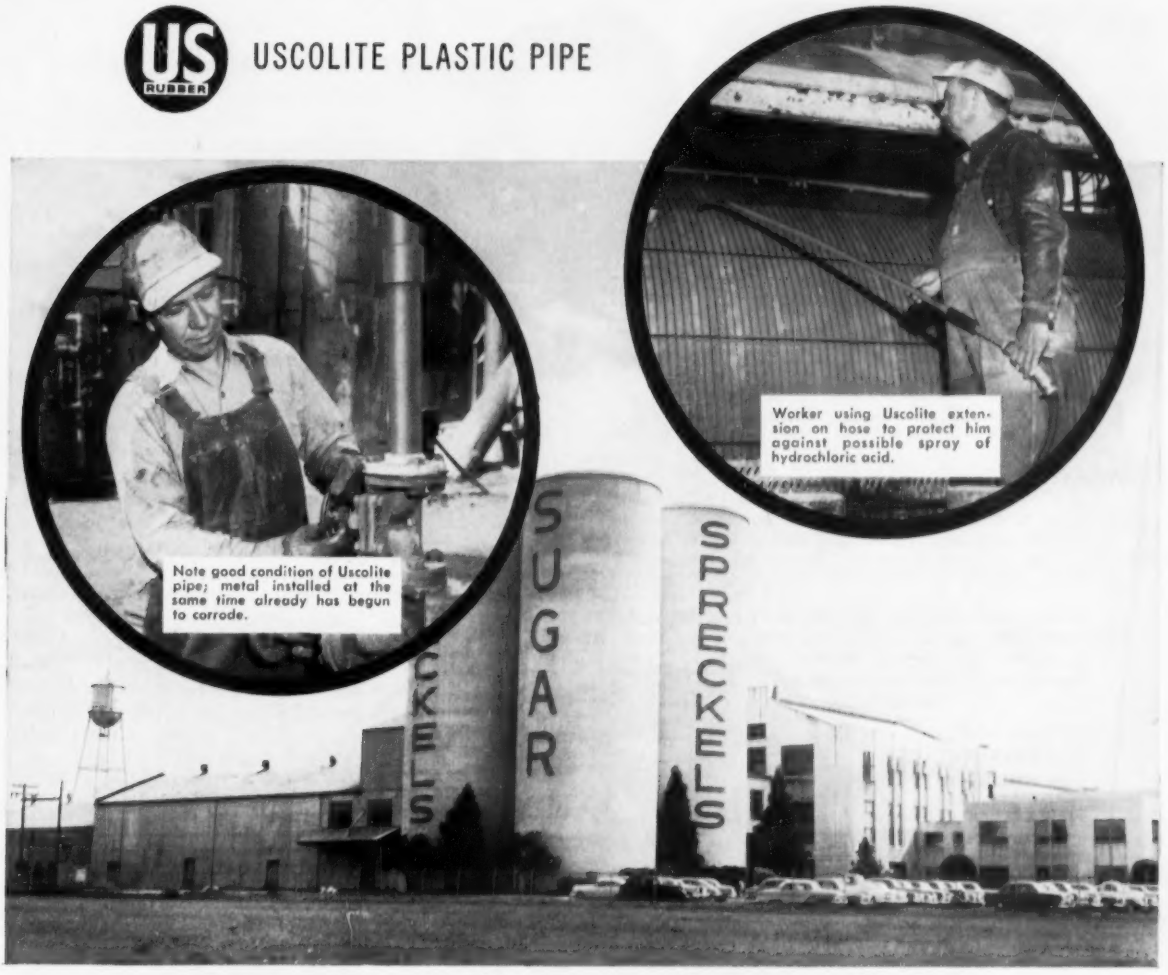
Temperature and humidity are controlled in more than 55,000 sq. ft. of the processing and storage space in order to safeguard food quality and extend and simplify production.

High-volume output at the Tuxedo plant called for large quantities of bulk sugar. To handle it, efficient systems—one for beet and the other for cane sugars—were installed by Link-Belt engineers.

Employed were two Bulk-Flo* systems—each a self-feeding, self-discharging combination elevator and conveyor. Conveyors consist of endless chains, to which cross-flights

* Link-Belt endless chain with spaced solid flights in a close-fitting enclosure.

USCOLITE PLASTIC PIPE


Worker using Uscolite extension on hose to protect him against possible spray of hydrochloric acid.
Note good condition of Uscolite pipe; metal installed at the same time already has begun to corrode.
SUGAR
SPRECKELS
SPRECKELS

8 reasons why this sugar factory selected USCOLITE PIPE

Here are the facts that convinced Spreckels officials to choose Uscolite® to handle highly corrosive hydrochloric acid in descaling evaporators and to clean filters:

1. It is resistant to the corrosive effects of acid.
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4. Uscolite can be ordered in any length or can be easily cut to size and threaded on the job. Other pipe had to be ordered to specifications.
5. There is no maintenance problem with Uscolite. "Shows no sign of deterioration," says plant superintendent.
6. Does not shrink or crack.
7. Easily installed.
8. Not a foot of Uscolite has had to be replaced since its installation 5 years ago.

The complete Uscolite line—elbows, tees, flanges, couplings, caps, valves, bushings—is obtainable at any of our 28 District Sales Offices, each staffed with factory-trained engineers; at selected "U.S." distributors or contact us at Rockefeller Center, New York 20, N. Y.

In Canada, Dominion Rubber Company, Ltd.

Which Uscolite Pipe best serves your needs?

Uscolite CP: styrene-acrylonitrile-butadiene copolymer; good resistance to strong acids, active chemicals; higher impact strength and operating temperatures.

Uscolite RV: an unplasticized, unmodified polyvinyl chloride; higher resistance to strong oxidizing acids and chemicals; good impact strength.

Mechanical Goods Division

United States Rubber

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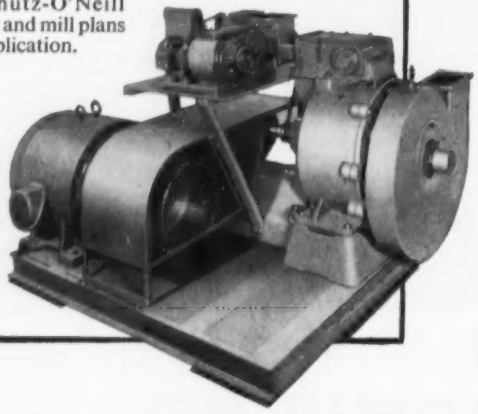
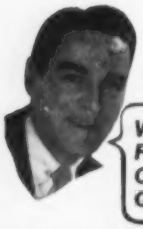
Without obligation to you, we'll grind a sample of your material in our Pilot plant, using a production model Schutz-O'Neill Superfine Pulverizer. This is a bonafide, no-strings offer to demonstrate to you the versatility, particle size range and capacity of Schutz-O'Neill Pulverizers. Write us for details.

OUR ENGINEERING TEST REPORT together with your processed product will be returned to you giving exact data and recommended Schutz-O'Neill equipment, methods and mill plans for your process application.

SCHUTZ-O'NEILL PILOT PLANT uses a standard production model 16" Superfine Pulverizer, which provides up to 100 different pulverizing set-ups with a grinding range from 40 mesh to 5 microns.





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Many heat sensitive products can be safely pulverized, because the grinding principle of impact with air attrition embodied in Schutz-O'Neill design keeps product temperatures down and helps control uniformity.

Typical Schutz-O'Neill applications are in the paint industry; major cocoa powder, sugar, spice and pharmaceutical manufacturers; processors of emulsifier gums, resin, plastic and seaweed extract powders and a great number of others. From 62 years of continuous manufacturing and field experience, Schutz-O'Neill may already have the answer to your problem. Superfine Pulverizers are made in six sizes ranging from 7½ to 125 horsepower with grinding chambers 12" to 28" in diameter.

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are attached at intervals—all contained in a close-fitting casing.

Both Bulk-Flos and screw conveyors are sealed vapor-tight, thus protecting sugar from moisture and dust.

Sugar is received in center-dump, trailer-tank trucks. It is gravity-discharged from truck, through a flexible chute, and into a receiving hopper mounted on a 24-ft. screw conveyor.

This galvanized conveyor is slightly inclined and has a 12-in.-dia. screw. It is driven by a 5 hp. gearmotor with chain drive.

Noteworthy are the self-lubricating Lignum vitae (wood) bearings used in the screw conveyors. This way, any chance of contamination of sugar by bearing metal or grease (as with metal ones) has been abolished.

The screw conveyor discharges beet sugar into a loop-type Bulk-Flo unit with galvanized Promal (Pearlitic malleable iron) chain and galvanized peaktop flights. Conveyor's vapor-tight enclosure is also galvanized. This 38-ft. tall unit is driven by a 7½-hp. gearmotor and roller chain at a 56 ft.-per-min. chain speed.

The Bulk-Flo unit discharges sugar into a chute that supplies a 24-ft. screw conveyor, which is driven by a 2-hp. gearmotor and roller chain. This conveyor delivers sugar into either an insulated storage bin (3,000-cu. ft. capacity) or, if bin is full, into a scale hopper inside the plant.

An air-operated, 2-way bucket gate on the chute is actuated by the batch-hopper scale. And when hopper is full, conveyor feeds sugar to storage.

Sugar is withdrawn from hopper-bottomed storage bin via a chute and goes into the first-mentioned screw conveyor. An air-operated, rotary cutoff valve in the chute is remotely controlled inside the factory.

The system for handling cane sugar is similar to the one just described. Briefly, a 28-ft. galvanized screw conveyor receives the bulk sugar and carries it to a loop-type Bulk-Flo unit for elevation to the top of a 1,150-cu. ft. capacity storage bin.

This unit has galvanized chain, flights, and casing. Its chain speed is 55 fpm., with the drive consisting of a 3-hp. gearmotor and roller chain.

Sugar can flow via an 8-in.-dia. spout from the Bulk-Flo into storage bin, or by a 10-in.-dia. spout into a scale hopper inside the plant. Again, the bin has a hopper bottom and sugar is reclaimed by gravity through a discharge chute delivering into the 28-ft. screw conveyor. A remotely controlled, air-operated, rotary cut-off valve is located on the chute.

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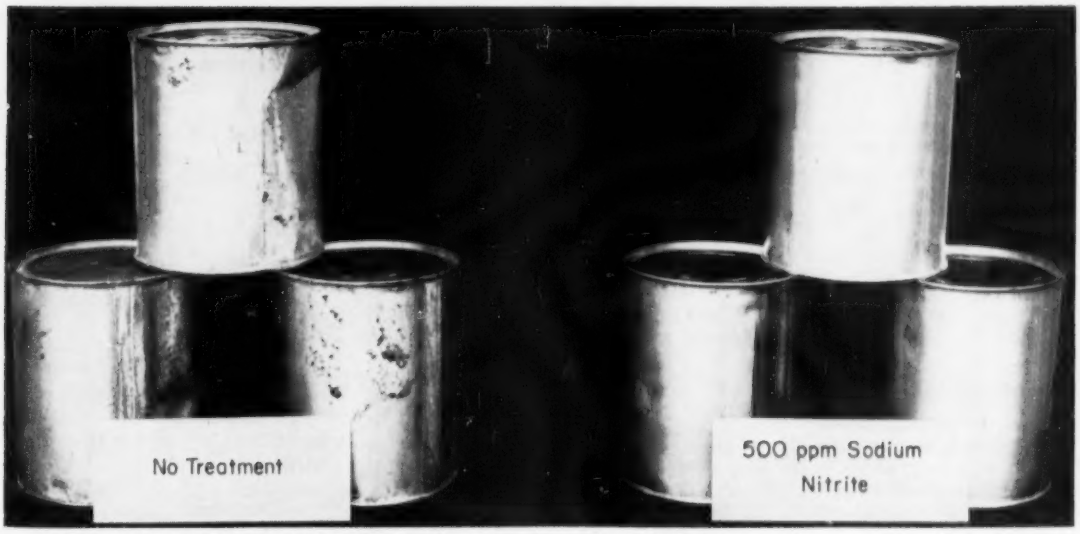

CONSIDERABLE RUST MARRING is evident in test containers (left) that came from processing where there was no treatment. But they're clean and clear (right) when treatment is employed, demonstrating how—

Nitriting Curbs Rust on Cans

Inhibiting technique may be readily applied by canners using hot water process. And agent is neither toxic or expensive. . . . Still seek suitable method for steam-processed items

J. R. MARSHALL
Chemist, American Can Co., Tampa, Fla.

MOST CANNERS will at some time have the misfortune of encountering rust on cans—a disagreeable, and frequently expensive, experience. And this includes those operators who exercise the greatest of care.

At the very least, such marring detracts from the container's appearance and sales value, and it may render the item unmerchantable.

Accordingly, the remedy indicated in the sodium nitrite ($NaNO_2$) treatment is well worth the canner's close examination and consideration.

To the canner using a hot water process, the nitrite can be of decided value as a rust inhibitor. It will protect his processing equipment from corrosion and will retard the formation of rust on the exterior of his cans during processing and subsequent storage.

Further, sodium nitrite is relatively inexpensive. Also, it isn't toxic in the quantities used. In fact, it already is employed in meat processing as a food additive.

It is not to be implied here that the nitrite is a "cure-all." Yet we have been able to show that it will retard rust formation in normal commercial operations, thus increasing feasibility of the use of lighter tin-coating weights.

As for the use of this agent as a rust inhibitor for steam-processed items, an attempt with a short-time high-concentration dip technique did not prove successful. However, here there will be further searches for a suitable means.

Tests and Their Results

To determine the desired concentration of the sodium nitrite for semi-commercial tests, strips of tinplate were immersed in varying solutions (concentrations of 0, 100, 200, 300, 400, 500, and 1,000 ppm.). The solutions were in 500 ml. beakers and stored at room temperature. No effort was made to control the dissolved oxygen or limit the amount of available oxygen.

Results: Above 200 ppm., no rust appeared on the strips during four weeks. But in the untreated water, slight rust was observed on the strips in about 24 hr.

Then, in the subsequent semi-commercial tests, sodium nitrite was added to the process water (400 to 600 ppm.). And periodically, additional nitrite was added to maintain the concentration. Here, both continuous cookers and batch-type retorts were used to study its effectiveness. However, employment in the cooling water was not considered because the expense would make this non-commercial, unless the water was recirculated.

Specifically, it was indicated that the protective film formed during processing gave adequate protection during cooling and normal storage.

With sodium nitrite in concentrations below 200 ppm., there is pitting of ferrous metals. Since the concentration is being continually diluted in the cooker by the condensation of steam and the replacement of water carried out on the cans, a method was developed for determining the concentration of sodium

Tips on Good Procedures

Lighter tin-coating weights perform as well as heavier weights—given good processing procedures.

Similarly, in good storage conditions the lightest tin coating performs satisfactorily, whereas under poor conditions the heaviest are not sufficient to prevent rusting.

Good procedures include use of non-corrosive process water; casing of dry, clean cans that are warm enough to evaporate any moisture traces; and clean, dry, uniform-temperature storage.

Even at their best, some packing procedures are too corrosive for reduced tin coating without special precautions.

Many times, only comparatively few cans rust (perhaps from wetness, sweating, or stacking on wet or green-lumber pallets). Rust in processing generally occurs on cans in a common location.

Actually, metallic corrosion in a conductive liquid is electrochemical—in effect, formation of an electrolyte cell by two dissimilar metals. Rusting is favored by impurities.

The Nitrite Idea

Considerable work has been done to develop a protective oxide film on iron similar to that occurring naturally on aluminum. It was found such films could be formed on ferrous metal, in the absence of dissolved oxygen, with an oxidizing material such as sodium nitrite.

The protective film in aerated solutions is formed primarily by reaction with dissolved oxygen. However, in deaerated solutions, the inhibitors react (due to their oxidizing character) directly with iron to form protective films.—J.M.

nitrite (detailed in an accompanying panel).

In truth, excessive amounts of sodium nitrite do not give significantly better results, hence careful control of its concentration in the water will mean savings, as well as preventing the dangerously low concentration.

The pH Aspects

Sodium nitrite cannot be used in solutions having a pH of lower than 6.5 because it decomposes chemically. In our tests, all water tested was found to be in the pH range of 6.5 - 7.5 and no pH adjustments were necessary.

Tests were run in more than one plant. Plant A used 303x406 cans made from common coke ends and No. 100-25 bodies. This plant employs two Draper cookers. The nitrite was added to one cooker in the recommended amounts, but none was added to the other cooker. The pH of the water was 7.5. Approximately 100,000 cans were run.

Cans from the cooker having sodium nitrite were practically rust-free when they reached the casing operation. However, cans from the cooker without the nitrite had considerable rust at points where the tin coating had breaks, such as scratches and small abrasions.

Subsequently, addition of nitrite to the latter cooker virtually eliminated all rusting.

In Plant B, the operation was slightly different, in that the lines carrying the cans to the packers run continuously. And cans traveling on these lines were subject to considerable body abrasion from contact with the guide rails.

A trial run of 65,000 of the aforementioned cans was made, using no chemical rust inhibitor. The cans were considered commercially acceptable at the end of the process.

However, at the end of one week's warehouse storage, about 40% of them had a slight yellow stain of rust at the points where they had been abraded by the guide rails.

The test was then repeated using 300-400 ppm. sodium nitrite in the cooker. After one week in the same warehouse, these cans were free from any rust at the abrasion marks on their bodies.

It was quite obvious that the protective film formed by the sodium nitrite had prevented rust formation during the warehousing.

Similar tests were then conducted at other citrus plants—and in all instances the amount of outside rust on the cans was greatly reduced by the use of nitrite.

Fruit-Sac Black Marks

In the packing of grapefruit sections, there is a tendency for juice cells to adhere to the outside of the containers. If the sacs stay in contact with the can for an appreciable length of time, the surface is dissolved down to the tin-iron alloy layer and leaves an unsightly black mark.

We have noted that when plants allow broken fruit sections to accumulate for a period of time before closing, there usually is a large amount of such external marking. During our observations, however, we have failed to find any rust at these marks, and since the bodies were usually covered by paper labels the condition was greatly minimized. For Government sales, these detinned areas might be considered objectionable. However, an actual Government-agency opinion has not been obtained.

Since these tests were instigated, several million cans made from No. 100-25 bodies have been packed with citrus sections without incident. In all cases, the packer felt that the nitrite was necessary and so added it to the cookers.

Besides protecting the cans, it was felt the material probably would extend the service life of the equipment. This specific point might well merit a separate study for full evaluation.

Two pimiento packers encountered rusting and severe spangling in processing 401x411 cans. Spangling is the etching of the tin coating so that the crystal pattern of the tin is visible. The boiling-water process for these cans of pimientos is approximately 100 min. Even with water that is only slightly corrosive, a cook of such duration brings out very obvious effects. These plants were using cans fabricated from common coke bodies and No. 50 ends.

It was believed that employment of sodium nitrite would retard this rust formation. But how it would effect the spangling was unknown. To test it, approximately 400 ppm. was added to the retorts. The cans were stacked in retort crates, and three of the retort baskets were placed in vertical retorts. After the cans were cooked and cooled, they were examined—and no rust or spangling of the tin was observed.

The actual mechanism by which the nitrite eliminated the spangling has not as yet been determined. However, the nitrite has now been used commercially for two seasons, and the corrosion and spangling has practically been eliminated.

During the 1955 pimiento season, test runs of 401x411 cans fabricated outside lacquered No. 25 ends and No. 100-25 bodies were made at two different pimiento plants (which we will refer to as Plants C and D).

At Plant C, they were filled in the normal manner, and given a

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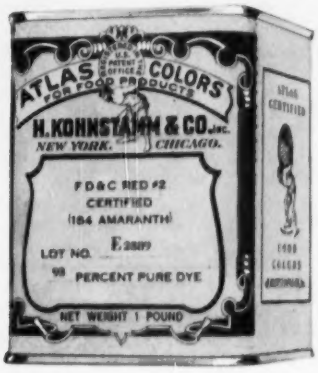

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Controlling the Concentration

Strength of the nitrite solution drops during processing (dilution through condensation and losses on cans going out).

Hence, careful control of concentration is pertinent—both to avoid a too-weak solution and to save on $NaNO_2$. The following method determines nitrite concentration:

Reagents: First, potassium permanganate solution, 1,065g. per 100 ml. prepared by dissolving a 1-gr. (.065g.) tablet in distilled water and making to 100 ml. Tablets dissolve slowly, so prepare solution early. Crush tablets with a stirring rod. Second, sodium bisulfate crystals (Sani-Flush or Bowlene are good sources).

Apparatus: Two graduates (one of 100 ml., other 25 ml.); a pipette (10 ml., Mohr type); a flask (250 ml. Erlenmeyer).

Method: Measure 25 ml. permanganate solution into 250 ml. flask, then add a few crystals of sodium bisulfate, to make solution acid, and titrate from 10 ml. pipette with sample of water to which sodium nitrite has been added until permanganate solution is decolorized. Brown precipitate means acid concentration is too low.

$$\text{Results: } \frac{17.75}{\text{ml. nitrite solution}} \times 1{,}000 = \text{Ppm. } NaNO_2$$

normal process in boiling water containing 400 ppm. nitrite. After processing and cooling, the cans were examined, and no corrosion was observed.

In the canner's warehouse, samples of the pack were placed in different locations that were conducive to sweat rusting. These cans were examined after ten months' storage and no rust was observed on the cans.

At Plant D, part of the same lot of cans were packed with pimientos and given a similar process, but without use of sodium nitrite. Here, the cans were slightly rusty when examined after the process and extremely rusty after ten months' storage in a commercial warehouse. However, other cans of pimientos processed in water containing nitrite and stored in the same warehouse had not rusted.

Steam-Processing Tests

Because many cans having reduced tin coating weights are steam processed, it would be desirable to give these specific cans additional protection through a rust inhibitor.

And since there is no liquid contact period to produce the 2 gamma Fe_2O_3 protective coating by oxidation with sodium nitrite in a steam process, the cans would have to be immersed for a short period of time in a concentrated solution of sodium nitrite prior to processing.

Solutions of sodium nitrite (180 deg. F.) containing 0, 500, 1,000, 1,500 ppm. and 1%, 1½%, 2%, and 2½% were prepared. Then strips of tinplate were immersed in them for 30 sec. intervals up to 2½ min. After the immersions, the samples were placed in shallow procelain trays containing ¼ in. of water.

Results indicated that this gave some rust protection to the tinplate, particularly at the higher concentrations and the longer time intervals.

However, there was considerable variation in the degree of protection.

Samples of the plate from above experiment were next placed in an autoclave and processed 1 hr. at 250F. The excess nitrite caused considerable spotting of the plate, giving it an objectionable appearance, and it did not appreciably retard rusting.

Thus, experiments to date using sodium nitrite dips to prevent corrosion during steam processing have not been encouraging.

Yet these experiments have been very cursory and a much more exhaustive study will be made.

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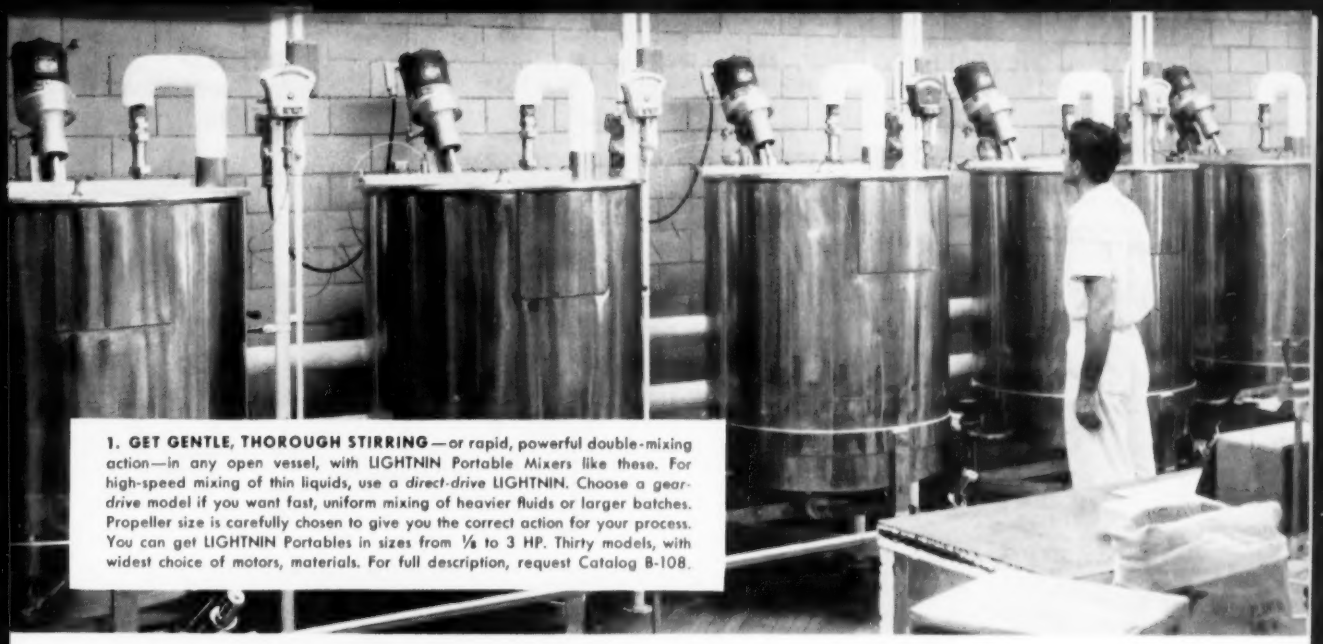
The above article is taken from the author's paper, "Sodium Nitrite as a Corrosion Inhibitor for the Canning Industry," recently presented before the Florida Horticultural Society in Orlando.

Acknowledgment is made by the author to R. Hoyt, Solvay Div., Allied Chemical & Dye Corp., and E. Lewis, Stokely-Van Camp, Inc., for their helpful suggestions relative to determining nitrite concentration.



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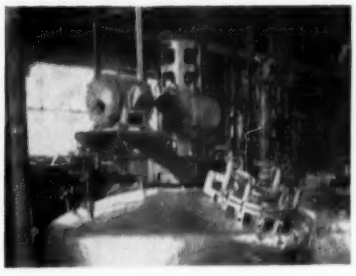

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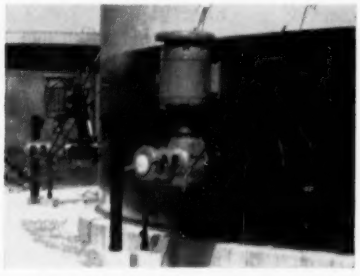

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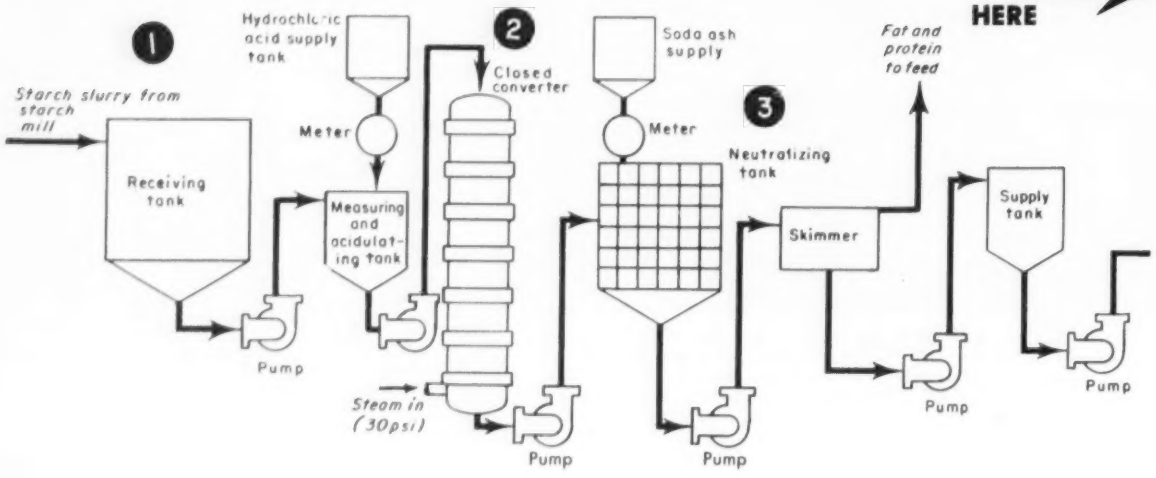


How Continuous-Batch Process Converts Starch to Sugar

Composite flowsheet of latest innovations shows how batch methods for making corn syrups and sugars is put on non-stop basis

EIGHT OF THE ELEVEN U. S. companies that process corn into starch also manufacture corn syrups. In addition, some of them make dried corn syrups and corn sugars, which include crude sugar and dextrose (a highly refined product). Hydrol (corn molasses) is produced as a byproduct of dextrose manufacture.

All these products derive from corn starch. And modern, continuous-batch methods for their production are fully revealed in this foldout flowsheet.

For syrups, process starts with partial hydrolysis of starch. A water suspension or slurry (about 23 Baume), is piped directly from starch mill to a receiving tank—Point (1) on our flowsheet.

Corn Syrups by Continuous-Batch Process

A measured amount of this slurry is acidified with a metered quantity of hydrochloric acid (0.12% of dry starch content).

This mix is pumped into a closed converter—Point (2)—and heated with live steam (30 psi.).

When hydrolysis reaches desired stage, slurry is emptied into a neutralizing tank (3), where pH is adjusted to 4.0-5.0 by adding a carefully measured amount of soda ash solution (sodium carbonate).

Next, neutralized hydrolysate, or "light liquor," is pumped into a skimmer. Fat and protein substances, which rise to the surface, are removed. Then the liquor is filtered to remove suspended solids (4). A vacuum filter is generally employed.

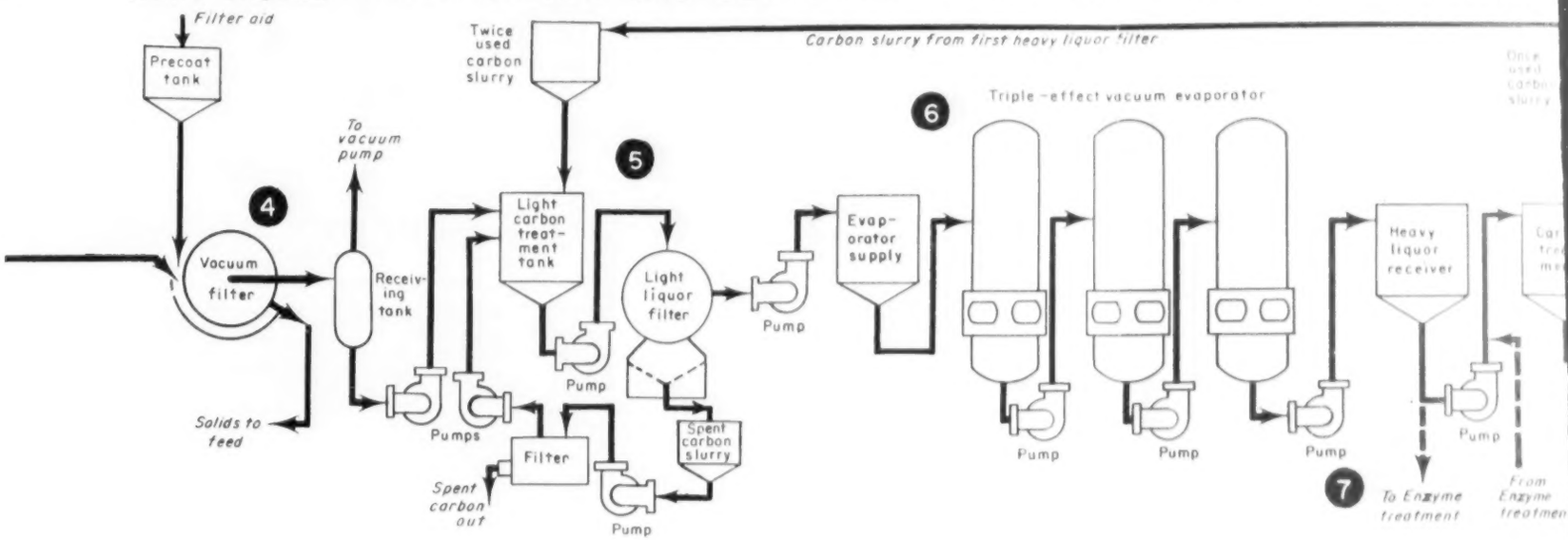
In our typical flow diagram, light liquor is next given one carbon treatment and filtering (5), then it's concentrated in a triple-effect evaporator to a density of about 30 Baume (6). It is now known as "heavy liquor."

Processes in different plants vary, however. Some employ powdered, activated vegetable carbon for the filtering and decolorizing step, others use granulated-char percolation filters. And in some instances, a portion of the mineral content is removed by ion exchange.

Dual-Conversion Syrups With Enzymes

Likewise, some processors produce dual-conversion or acid-enzyme syrups. Here, acid hydrolysis is carried to an intermediate level of 48-55 DE (dextrose equivalent).

Treatment by diastatic enzymes follows partial concentration, heavy liquor being pumped into enzyme treatment tanks (7). After action has progressed to



desired level, enzymes are inactivated, and heavy liquor returns to follow the same process as acid-converted syrups.

In the process diagrammed here, heavy liquor gets two successive carbon treatments and filtrations—Points (8) and (9)—then passes through a final safety filter.

The decolorizing carbon is re-used at various processing stages in a counter-flow manner—that is, fresh carbon, mixed with hot water, is introduced at the last clarification step, then is fed forward to the earlier stages. Finally, spent carbon from the first stage is "sweetened off" with hot water and discarded. Liquor recovered in this action is returned to process at (5).

Concentration to final density is the last stage in manufacture of corn syrup, and is conducted in large, vac pans (10). Finished syrup is cooled and passed through a strainer on its way to loading or packing station.

Some plants dehydrate corn syrup to produce corn-syrup solids. In this operation, finished syrup is dried to a moisture content of less than 3½%. Resulting granular material is either bagged directly or ground to a fine powder before packaging.

Corn Syrup Process Changes Variables

When corn sugar is the desired end-product, process variables are changed slightly. Starch slurry is diluted to about 10 Baume. A slightly higher acid concentration and higher steam pressure are used, and converting times are longer than for corn syrups.

In production of crude corn sugar, heavy liquor (after final concentration) is run into casting pans, where it crystallizes into solid blocks. Some crude sugar is sold in this form, some is put through chippers and bagged.

Further processing is required for dextrose, however. Heavy liquor from the final evaporator is pumped into crystallizers—Point (11)—equipped with slowly moving agitators. Here, seed crystals from a previous batch aid in crystallization of the dextrose.

After about 100 hr., resulting mixture is fed through centrifuges (12) to separate crystals from the "mother liquor." The dextrose is washed with water while still in the centrifugal units. Then, it is dried, cooled, screened, and packed.

Mother liquor from the first dextrose cycle ("greens") contains much partially converted material. Hence, it's pumped back to separate converters for reprocessing and crystallizing.

Liquor obtained from the second process is dark in color and has a heavy body and flavor. Called "hydrol," it is used mostly in animal feed.

Close Control of Variables

Accurate control of processing variables assures users of uniformly high quality. First of these factors is regulation of dextrose equivalent (DE), which is a measure of the degree of conversion.

Dextrose equivalent is defined as the reducing sugar content, calculated as dextrose and expressed as a percentage of the total dry substance.

Hydrolysates up to 12 DE are commonly called dextrins; from 13 to 29 DE, malto-dextrins; and from 30 to about 70 DE, corn syrups.

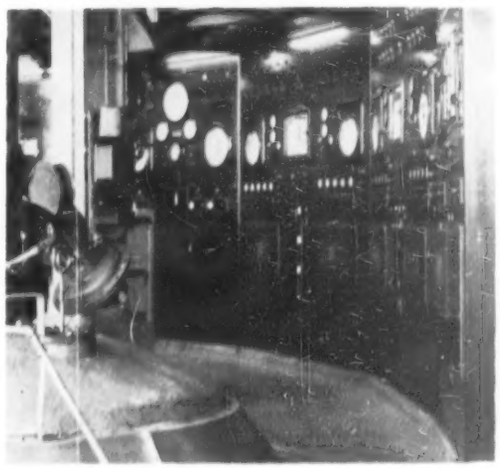
The corn syrups are further divided into four major types:

1. Low conversion ..... 30 to 37 DE
2. Regular conversion ..... 38 to 49 DE
3. Intermediate conversion ..... 50 to 57 DE
4. High conversion ..... 58 DE and up

Baume ratings of corn syrups are also carefully controlled, and are commercially available in a range of 41 to 46 Be. This measurement is a function of density, and reasonably defines the dry substance content (from 77 to 88%).

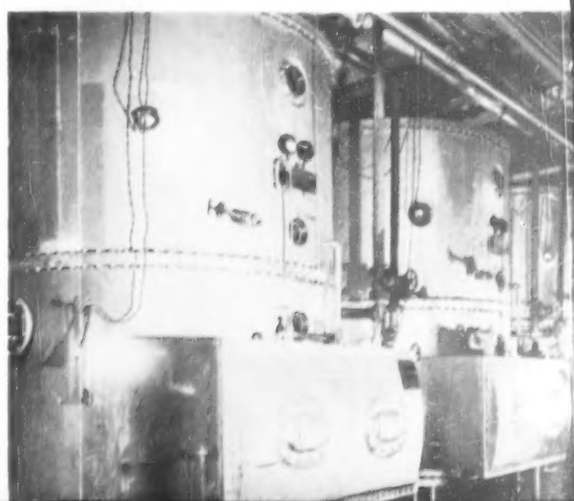
Likewise, acidity is subject to close manufacturing control. Most syrups and sugars have a pH of about 5.0. And unless otherwise specified, they are manufactured with minimum color, flavor, and nitrogen content, and maximum clarity.

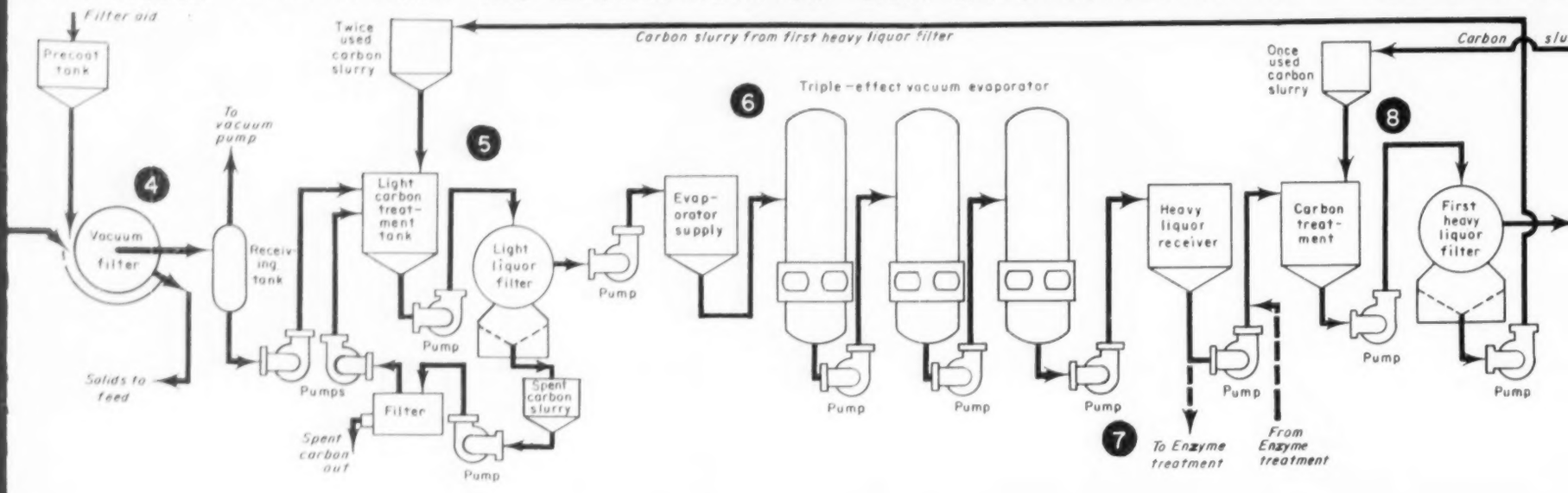
FE gratefully acknowledges the help of Floyd A. Lewis, Corn Industries Research Foundation, for his help in preparing this flowsheet.



2 **CENTRAL CONTROL PANEL** automatically handles batch measurement of starch, addition of acid, and admittance of steam to closed converter.

6 **TRIPLE-EFFECT EVAPORATOR** concentrates light liquor is 5 in. in first stage (200F.), 15 in. in second (175F.), and in third (140F.).





, enzymes are inactivated, and heavy liquor ollow the same process as acid-converted

ocess diagrammed here, heavy liquor gets ve carbon treatments and filtrations–Points then passes through a final safety filter.
lorizing carbon is re-used at various process- a counter-flow manner–that is, fresh car- with hot water, is introduced at the last step, then is fed forward to the earlier ally, spent carbon from the first stage is off" with hot water and discarded. Liquor this action is returned to process at (5).
ation to final density is the last stage in of corn syrup, and is conducted in large, 0). Finished syrup is cooled and passed strainer on its way to loading or packing

nts dehydrate corn syrup to produce corn- In this operation, finished syrup is dried re content of less than 3½%. Resulting terial is either bagged directly or ground to er before packaging.

Process Changes Variables

rn sugar is the desired end-product, process changed slightly. Starch slurry is diluted Baume. A slightly higher acid concentra- gher steam pressure are used, and converting nger than for corn syrups.
ction of crude corn sugar, heavy liquor concentration) is run into casting pans, rystallizes into solid blocks. Some crude in this form, some is put through chippers

rocessing is required for dextrose, however. nor from the final evaporator is pumped llizers–Point (11)–equipped with slowly tators. Here, seed crystals from a previous crystallization of the dextrose.
ut 100 hr., resulting mixture is fed through 12) to separate crystals from the "mother liquor." The dextrose is washed with water while still in the centrifugal units. Then, it is dried, cooled, screened, and packed.

Mother liquor from the first dextrose cycle ("greens") contains much partially converted material. Hence, it's pumped back to separate converters for reprocessing and crystallizing.

Liquor obtained from the second process is dark in color and has a heavy body and flavor. Called "hydrol," it is used mostly in animal feed.

Close Control of Variables

Accurate control of processing variables assures users of uniformly high quality. First of these factors is regulation of dextrose equivalent (DE), which is a measure of the degree of conversion.

Dextrose equivalent is defined as the reducing sugar content, calculated as dextrose and expressed as a percentage of the total dry substance.

Hydrolysates up to 12 DE are commonly called dextrins; from 13 to 29 DE, malto-dextrins; and from 30 to about 70 DE, corn syrups.

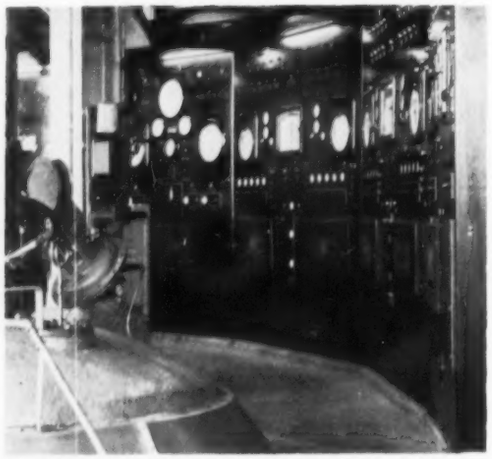
The corn syrups are further divided into four major types:

1. Low conversion ..... 30 to 37 DE
2. Regular conversion ..... 38 to 49 DE
3. Intermediate conversion ..... 50 to 57 DE
4. High conversion ..... 58 DE and up

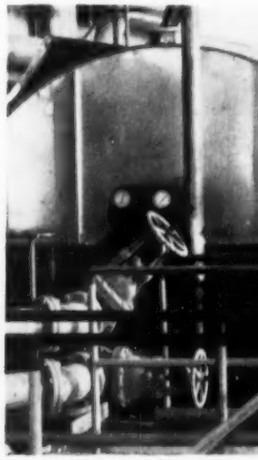
Baume ratings of corn syrups are also carefully controlled, and are commercially available in a range of 41 to 46 Be. This measurement is a function of density, and reasonably defines the dry substance content (from 77 to 88%).

Likewise, acidity is subject to close manufacturing control. Most syrups and sugars have a pH of about 5.0. And unless otherwise specified, they are manufactured with minimum color, flavor, and nitrogen content, and maximum clarity.

FE gratefully acknowledges the help of Floyd A. Lewis, Corn Industries Research Foundation, for his help in preparing this flowsheet.

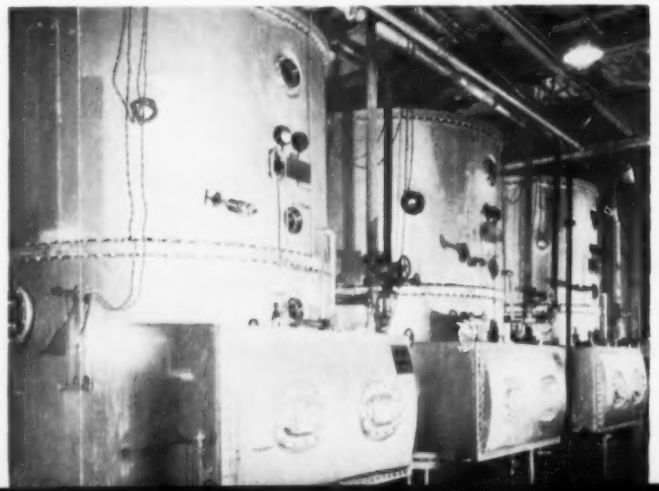


2 CENTRAL CONTROL PANEL automatically handles batch measurement of starch, addition of acid, and admittance of steam to closed converter.

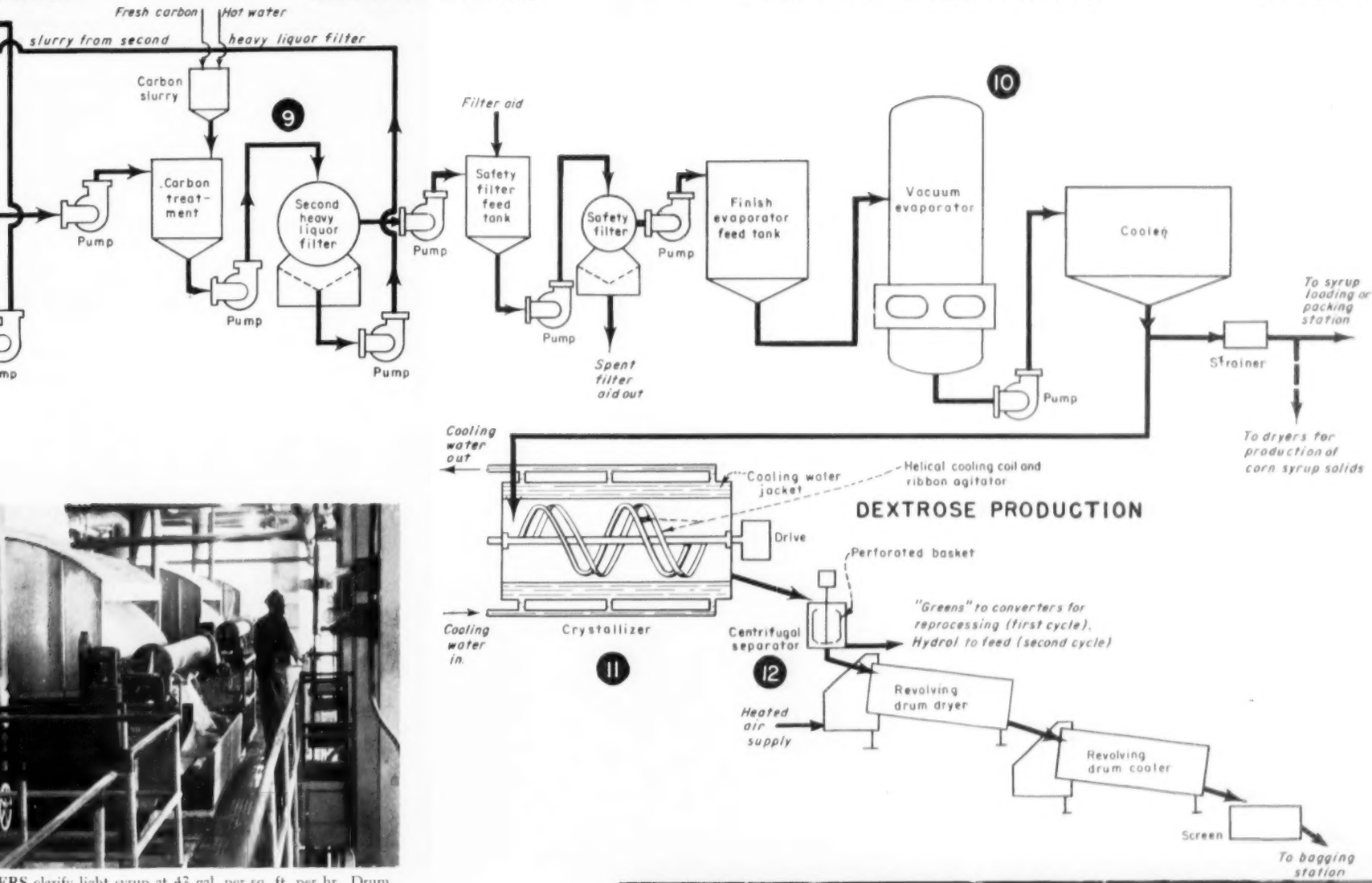


4 VACUUM FILTERS cla units (250 sq. ft. surface) are removed continuously.

6 TRIPLE-EFFECT EVAPORATOR concentrates light liquor. Vacuum is 5 in. in first stage (200F.), 15 in. in second (175F.), and 25-27 in. in third (140F.).

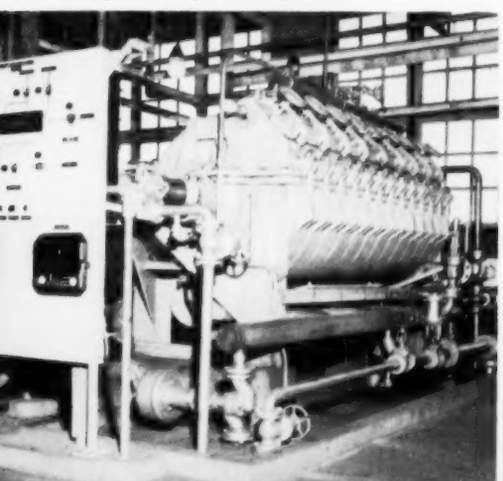


8 INSTRUMEN polish to heav tate inside shell.

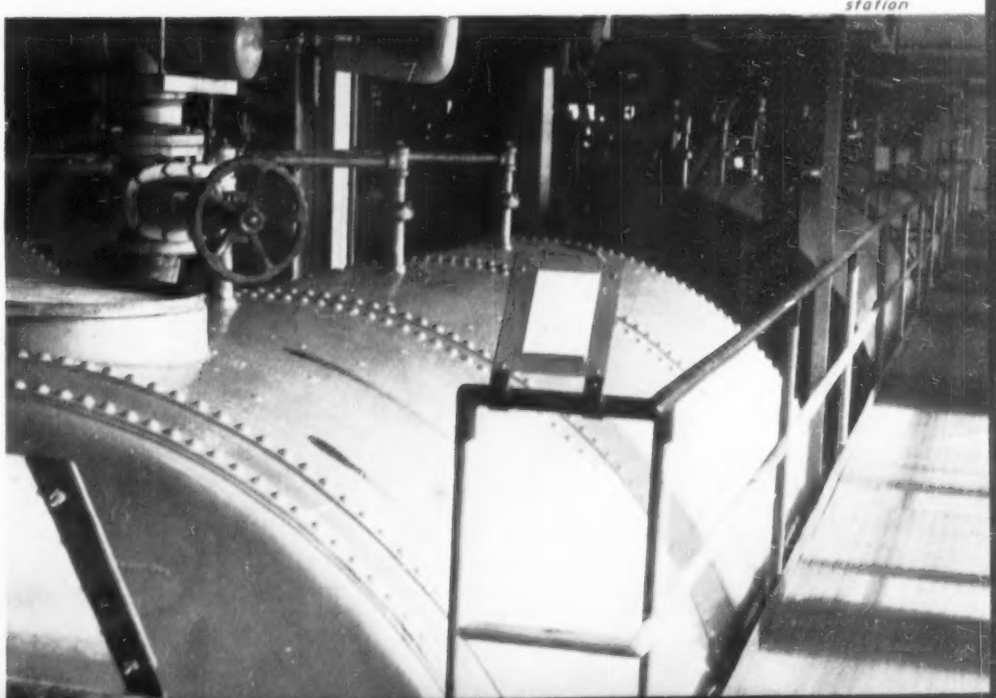


ERS clarify light syrup at 43 gal. per sq. ft. per hr. Drum surface) revolve and dip into liquor-filter aid slurry. Solids sly.

RUMENT CONTROLLED filter (Vallez) gives final to heavy liquor. Hollow shaft and cloth-covered disks ro- shell. Pump forces liquor through disks.



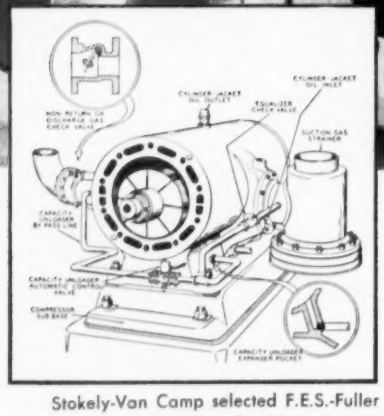
11 CRYSTALLIZ-ERS employ helical, slow-moving dashers and cooling coils to separate dextrose from the mother liquor. Vessel is likewise jacketed for further chilling. Note three water inlet pipes on top of the closed vessels. Complete separation takes about 100 hr.



Continuous Freezing of Retail Cartons at Rate of 180 per Minute Requires Only One Operator

at Stokely-Van Camp, Inc., Winnebago, Minn.

Frozen food packages entering the Freezing Equipment Sales continuous freezer from high-speed filler. Compact insulated room freezes 24,690 12-oz. packages at one time. Only the product enters and leaves the room.



Stokely-Van Camp selected F.E.S.-Fuller Rotaries to provide a flexible two stage refrigeration system capable of matching a variable refrigeration load. Stokely-Van Camp's battery of Plate Frosters, loose product Belt Freezer and continuous Package Freezer are served by F.E.S.-Fuller Rotaries under varying refrigeration requirements from 3" to 10" Hg. Vacuum.

1973
C-280

Compactness and simplicity of design make FES-Fuller Rotary the most popular refrigeration booster. Rotary principle of gas compression insures high efficiency at large gas volumes to give compact and light weight machine generally smaller than the driving motor. Absence of suction and discharge valves, connecting rods and crankshaft give a simplicity in design which guarantees low maintenance cost and quick overhaul if any plant shutdown is necessary.

Whatever *your* refrigeration requirements, turn to service-proved FES-Fuller Rotary Booster.

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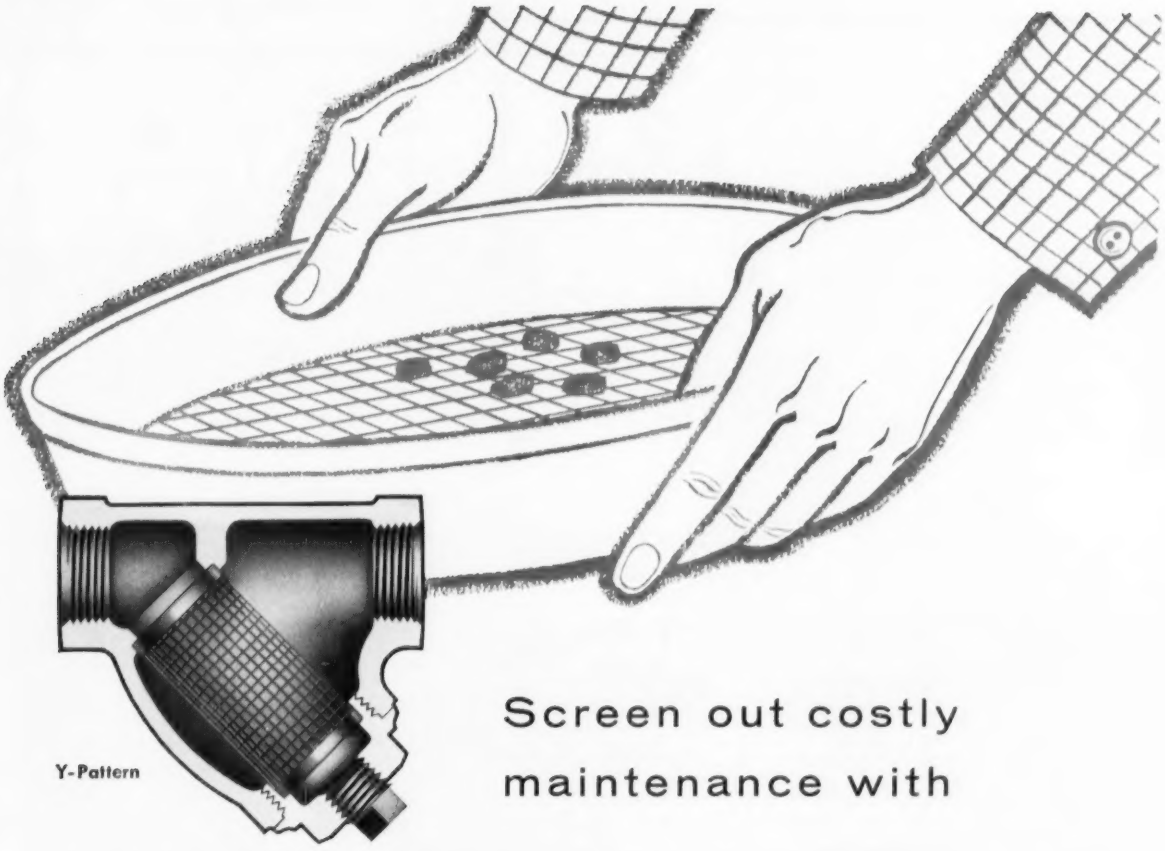
Qualified distributors in principal cities

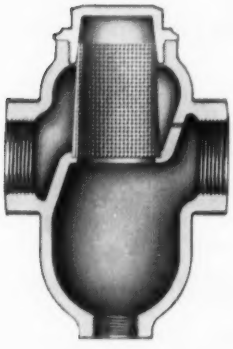
LOW TEMPERATURE FREEZING EQUIPMENT



Y-Pattern

Screen out costly maintenance with

CRANE SEDIMENT SEPARATORS



Vertical Types

Crane Sediment Separators positively and automatically trap foreign matter in fluid handling lines—steam, water, air, oil or gas, high or low pressure—and hold it for easy removal.

Dirt, scale, sand and other injurious particles are prevented from damaging or spoiling product and ruining valve seats, automatic devices and other delicate equipment.

Because of their exceptionally large screening areas—more than 500% greater than pipe area—Crane Sediment Separators assure unrestricted flow of product, even when partially plugged. Note special blow-off connection for drain valve attachment which permits easy cleanout without interrupting flow service.

LITERATURE SENT ON REQUEST

Available in both Y-patterns and vertical types, with full range of capacities and sizes. For literature on Crane Sediment Separators, see your Crane Representative or write to address below.

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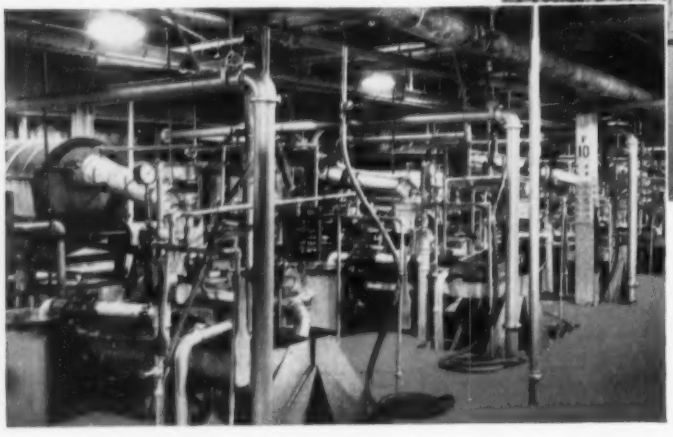
Seabrook minds its PeaS and QualitieS with Taylor Quality Grader Controls

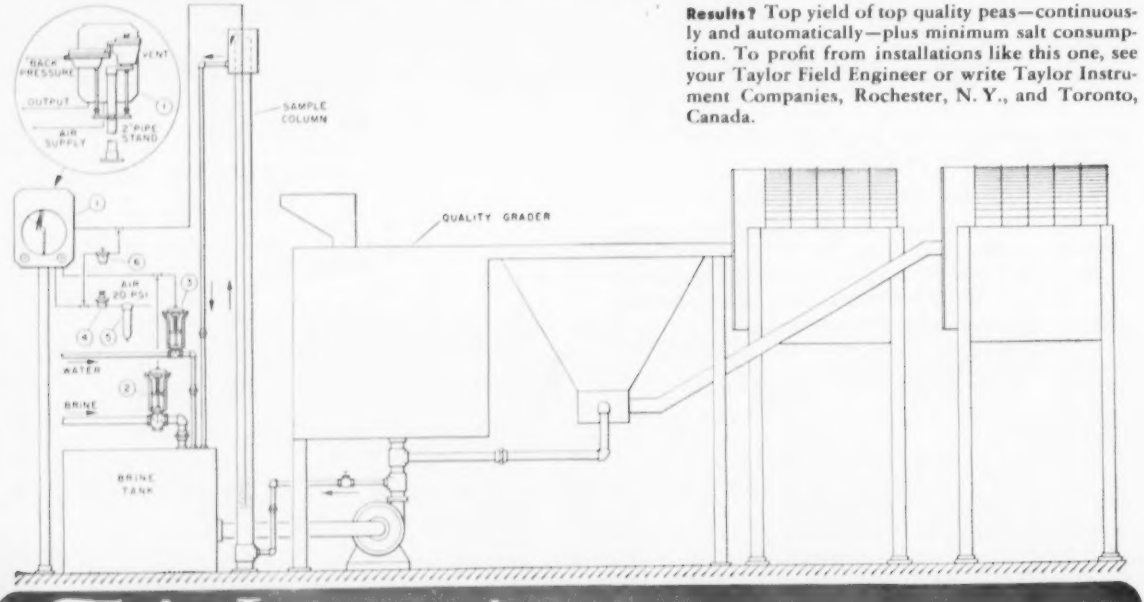
Better Peas cheaper—that's what Taylor's Brine Density Control System means to Seabrook Farms Co., Bridgeton, N. J. Nationally known for growing the fine foods it processes and markets, Seabrook relies on Taylor to get top quality pea grading. This is done efficiently and economically by the flotation principle.

Taylor High Accuracy Mercury Manometers measure brine density in Sight Feed Bubblers. Any density change in the grader is quickly detected—the Recording Controller then opens brine or water valves to return it to the correct value.

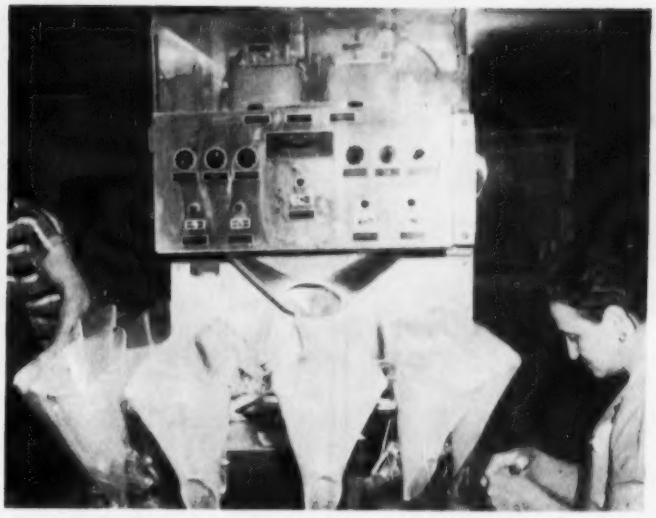


Completely automatic control results from use of two throttling type control valves on the brine and water lines—both operated by the same Controller but so staggered that only one opens at a time. Thus density can be diluted as well as increased as required by a simple set point adjustment.

Results? Top yield of top quality peas—continuously and automatically—plus minimum salt consumption. To profit from installations like this one, see your Taylor Field Engineer or write Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.



Taylor Instruments **MEAN ACCURACY FIRST**



NEW WAY ups performance-per-girl 66%! In efficient bagging-line operation, run by crew of only three, candies are elevated from hopper to net weigher (left photo). They're then automatically weighed and discharged into Pliofilm bags secured to rotary, 12-spout filler at 40 bags per min. (right photo).

By putting in automatic loading system feeding product into more accurate dual net-weigher, they get . . .

OLD WAY: Twice as much floor space was required by the former manual method of weighing and filling. And ten girls had to be assigned to handle the work.

Faster Bagging—With Fewer Girls

W. STUDEBAKER and BILL WARNER

Respectively, Plant Superintendent, Zion Candy Industries, Zion, Ill. and Engineer, The Woodman Co., Decatur, Ga.

DO IT BY HAND—and it takes *more* hands. But do it by machine, and it takes *less*.

Once more, that practical axiom has been demonstrated, this time in the bagging of hard candies at Zion Candy Industries, Zion, Ill. The improved efficiency was won by installing a new weighing machine (Woodman's Plur-A-Matic) equipped with two scales, plus an automatic loader and elevator conveyor.

This new system requires only three girls to put out 500 cases (24 8-oz. bags per case) in an 8-hr. day. This averages out as better than 166 cases per girl assigned—an up of 66%.

In contrast, the old method of hand weighing and filling required ten girls, with performance-per-worker averaging only 100 cases. Here, six girls weighed and filled candies into bags, while four operated the semi-automatic bag sealers and two packed bags into shipping cases.

More accurate weights—without need of check-weighing—is now being obtained. Weighing machine holds fill averages to ¼ oz.

Moreover, it takes little time to break in a crew to bag candies by the new automatic method. Formerly, it

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RUBBER TREADS . a wide choice of treads suited to all types of floors, including Darnelloprene oil, water and chemical-resistant treads, make Darnell Casters and Wheels highly adapted to rough usage.

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ILLUSTRATED MANUAL

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60 WALKER STREET, NEW YORK 13, NEW YORK
36 NORTH CLINTON STREET, CHICAGO 6, ILLINOIS

took 3-4 weeks to train a good crew.

And the new line takes up only about half the amount of floor space.

Packaging Details

Assorted hard candies are automatically fed to the dual net-weighing machine through a built-in loading and elevator conveying system.

Candies are first dumped into a waist-high, stainless steel, 150-lb.-capacity hopper (12x24x54 in.). A 20x48-in. canvas-type horizontal conveyor belt carries the confections from bottom of hopper, past open end of hopper, and along a short stainless chute with built-in screen for separating out candy fragments.

An inclined 6-in.-wide conveyor belt, with cleats spaced about 1 ft. apart, then elevates candies up a 10-ft. incline, and at 120 fpm., into the 25-lb.-capacity stainless hopper of the net-weighing machine. A pivoted, counterbalanced "space"-type chute discharges candy into this secondary hopper.

As this hopper fills up, candy is held back in the chute, thus weighting it down and tripping a Microswitch that shuts off motor driving the inclined and floor-hopper conveyor belts.

From secondary hopper, candy proceeds in a double stream to two alternating dumping scales (Toledo). Each stream of candy is gravity-fed into inclined pans, mounted on live rubber and fitted with a variable amplitude vibrator that is controlled by a spade leading into the feeder trough.

Sloping pans are designed and mounted to support relatively large amounts of candy, and still assure clean, sharply controlled feed.

Key to the net-weigher operation is the use of feeder troughs that receive a thin stream of candy, tailored to their requirements. Midway along the length of each trough, a divider rises to provide two parallel flows (bulk and dribble) of product. Rate of candy flow is pre-set from a machine-mounted panel by adjusting a "bulk"-regulating rheostat controlling the Syntron vibrator.

Each scale hopper is designed with two sections—the main one catching the bulk feed and within which is a small pocket for dribble feed.

As a scale nears its pre-set balance point, a set of electrical contacts on scale opens. Then a specially designed flexible scale, designed to minimize product damage, shuts off discharge end of bulk trough and permits product to flow only from the narrower dribble section of trough.

After this, control of the Syntron feeder is transferred from "bulk" to "dribble" rheostats. And product now continues in a thin, slow stream into dribble pocket of scale hopper until scale reaches exact balance. At this stage, another set of electrical contacts opens, to completely stop the Syntron feeder.

A triple timing circuit now takes over in this manner: First timer opens scale hopper door long enough to insure complete discharge of product. As product slides from weigher into a rotary, intermittently operated, 12-spout filler, a second timer holds filler in position.

After product is discharged into filler, scale-hopper door closes, bulk-feeder gate opens, and weighing cycle repeats.

At the same time, the filler indexes, carries a full bag away, and brings up an empty one into filling position. When empty bag is in position, third timer transfers entire timing circuit to second scale of dual-head net weigher.

Spouts of filler are constructed of heavy gage, transparent plastic material. And the bags (Pliofilm) are hand-fed on filler (beneath spouts) equipped with spring-actuated, metal bar-type bag holders.

Filled bags are then discharged onto a V-shaped belt as they travel over a tripper. This device (a horizontal metal bar) raises the bags to release the spring and then the bag.

V-belt then carries the bags to a semi-automatic heat-sealing machine. Bagged candies are then hand-packed into shipping cases.

Employing three girls (operating filler and heat sealer and packing into cases), speed on the weighing line is about 40 per min.

"It's the ultimate in convenience packages — the new pop-up self-feeder!"

Who said adding protein costs money?

He invests 1¢ in Pro-80 Vital Gluten . . . Gets a 3¢ to 5¢ premium on every loaf!*

This typical example of Pro-80 economy suggests possibilities for your products. For instance, if your foods now contain as little as 7½ percent protein, you can increase protein content to more than 11 percent with Pro-80 for only 1½ cents per pound of finished product. In addition, Pro-80 improves cohesiveness, often improves flavor, bite and tolerance—adds no taste or odor of its own.

Sale of Protein Foods on the Increase

Each year consumers become more aware of health and diet; foods with protein added become more popular. Get your products in step with this nation-wide trend . . . create new markets, new products. Use Pro-80 to enrich:

Cereals	Puddings
Breads	Baby Foods
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Macaroni Products	and many others

Easy to Use Pro-80 Vital Gluten (80% protein, moisture free basis) hydrates rapidly, blends smoothly, is bland and compatible. Standard package, 100 lb. bag.

**Cost of raising protein content of a 1 lb. loaf of bread 20% with Pro-80 Vital Gluten.*

GET MORE FACTS!

Send for booklet which shows how Pro-80 builds sales, profits. Write Special Commodities Division of General Mills, Minneapolis 1, Minnesota.

Pro-80 Vital Gluten, new wheat protein concentrate is made only by

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General Mills

MINNEAPOLIS 1, MINNESOTA

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DINNER-TABLE POPULARITY of pre-peeled French-fry potatoes (above) is seen assured by improved process and package. Note attractive, uniform color of vacuumized potatoes. Spud-shaped carton "window" displays product.

Vac-packaged in the manner described here, French-fry potatoes require less than a fifth the conventional anti-darkening dose of SO_2. Thus, former off-flavor and "weeping" may be curbed, which widens the door to retail marketing . . . Alternate use of ascorbic acid to prevent discoloration explored

Technique Ups Quality, Shelf-Life Of Pre-Peeled Potatoes

E. E. ANDERSON and C. ZAPSALIS

Department of Food Technology, University of Massachusetts, Amherst. (Since these studies, the first-named author has become associated with Arthur D. Little, Inc., Cambridge, Mass.)

DESPITE the surging consumer acceptance of the new convenience foods, pre-peeled potatoes have not won top popularity.

A prime factor in this situation is the SO_2 taste that remains after the potatoes are immersed in sodium bisulfite solution to prevent discoloration. Even more important is the need for a type of packaging that will provide the shelf-life necessary for marketing at the retail level.

These salient points formed the basis of our recent experiments at the U. of Massachusetts with the French-fry style of pre-peeled potatoes. Here are the major findings:

1. Markedly lower levels of SO_2 may be used to inhibit discoloration —or the agent may be replaced by ascorbic acid—when potatoes are packaged in Cryovac, with vacuumizing and heat-shrinking of the container.

2. Thus treated and packaged, these pre-peeled potatoes might be suitable for retail marketing. And for portion control, several individual bags could be packed in a master container.

3. Treated with 600-2,000 ppm. of SO_2, and held at 35-40F., spuds are saleable after 10-16 days. And with ascorbic-acid concentrations of 1.3%, storage life ranges 10-13 days.

4. Use of lower SO_2 levels tends to curb "weeping" of potatoes in storage. However, treatment with ascorbic acid avoids the detrimental effect of SO_2 on the product's natural vitamin B_1 content.

In preparing this item, skins of raw potatoes are removed, usually by abrasion, steam, or lye peeling. After trimming, peeled spuds may be left whole, or be cut into French fries, or into cubes for hash-brown potatoes. Then they usually are immersed in a solution containing SO_2, packaged, and held at refrigerated temperatures (preferably 40F. or lower) until used.

General reviews of this subject were presented by Anderson, Esselen, and Fellers,[1] and by Harrington *et al.*[2] However, there is only one published reference[3] to vacuum packaging of pre-peeled potatoes in flexible films (polyethylene).

Previous work at the Department laboratory indicated that, by conventional processing, whole or French-fry-style pre-peeled potatoes could be stored up to three weeks at 35-40F. This involved dipping them for 15 sec. in an aqueous sodium bisulfite solution containing 10,000 ppm. SO_2, and then packaging loosely in polyethylene.

However, through use of vacuum packaging in plastic films, it was ex-

pected that comparable storage life might be obtained even though this SO_2 level was cut substantially.

Packed Under Vacuum

Polyethylene and Cryovac bags holding at least 500g. of product were selected for experimental packs. Two lots of locally obtained potatoes were used—one being Irish Cobblers grown in New York, the other a Florida potato of unknown variety.

Following initial washing, spuds were abrasion-peeled and kept under cold water until they could be hand-trimmed. They were then cut into strips about ½ x ½ x 2-3 in., dipped in various anti-darkening solutions, and packaged.

Both packs were then subjected to mechanical vacuum, which compressed the bags tightly about their contents. While on the vacuum line, necks of the bags were twisted and sealed tightly to prevent any ingress of air.

Items packaged in Cryovac bags were also dipped momentarily in a 205F. water bath, which shrunk this film even more tightly. Packs were then stored at 35-40F. and observed periodically for development of discoloration or microbial spoilage, amount of exudate, and loss of moisture (weight loss).

So effectively did this vacuumizing reduce the amount of air in the bags that it was apparent the SO_2 concentration in the dipping solution could be considerably lower than the 10,000 ppm. recommended for potatoes packaged in non-vacuumized containers. This was considered highly desirable in view of occasional consumer complaints of SO_2 flavor in pre-peeled potatoes.

Table I shows storage life at 35-40F. of French fries that had been treated in sodium bisulfite solutions containing 0-2,000 ppm. of SO_2* and packaged in Cryovac and polyethylene bags with and without vacuum treatments. From this data, it is seen that products packaged in Cryovac kept from 2-5 times longer than those packaged in polyethylene.

Although polyethylene is considered to be quite gas permeable, it was surprising to find no difference in storage life between items packaged in polyethylene with or without initial vacuum treatment. Probably, differences between the two films are largely attributable to their gas-permeability characteristics (CO_2 and O_2), which are termed "very low" for Cryovac and "high" for polyethylene.[4]

Specific oxygen permeabilities[5] of these films at room temperature are 8,000-11,000 ml. of dry gas for polyethylene and less than 350 ml. for Cryovac.

Having achieved storage lives of 10-14 days with dipping solutions containing only 600-1,000 ppm. SO_2, it was decided to substitute ascorbic acid for sodium bisulfite as an anti-darkening agent. If a storage life of 5-10 days at 35-40F. could be realized, use of a dipping solution without SO_2 would accomplish two objectives:

Ascorbic Acid Also Effective

First, consumer complaints of residual SO_2 would be eliminated. Second, the detrimental effect of SO_2 solutions on the natural vitamin B_1 content of French fries would no longer be of concern.

Table II gives storage lives at 35-40F. of pre-peeled potatoes dipped in aqueous ascorbic acid solutions of varying concentrations, and then packaged in Cyrovac and polyethylene. Use of a 1% ascorbic acid solution would seem practical, since a 10-day storage life at 35-40F. resulted when potatoes were dipped for 60 sec. and packaged in Cryovac by vacuumizing and heat shrinking the bag.

"Weeping" or accumulation of liquid exudate was determined in both types of packages throughout the storage period. Amount of exudate varied from 0 to 6%, higher figures resulting from longer storage.

After comparable storage periods, French fries packaged in polyethylene generally had less exudate than those

*Based on aqueous solutions of anhydrous sodium bisulfite calculated to contain 61.49% SO_2.

Test Data Reveal How Research Ups Shelf-Life of Pre-Peeled French Fries

TABLE I—VACUUM PACKAGING in Cryovac Boosts Keeping Time of SO_2 Treated* Product

Package	SO_2 Content of Dipping Solution (PPM)	Storage Life at 35-40 F. (Days)
Polythylene (vacuumized)	2,000	3
	1,000	2
	600	1
	300	1
	0	0
Polyethylene (no vacuum)	2,000	3
	1,000	2
	600	1
	300	0
	0	0
Cryovac (vacuumized)	2,000	16
	1,000	14
	600	10
	300	7
	0	2

*Dipping time, 60 sec., sample weight, 500g.

TABLE II—ASCORBIC ACID Can Replace SO_2 When Potatoes* Are Vac-Packaged in Cryovac

Package	Ascorbic Acid in Dipping Solution (%)	Storage Life at 35-40 F. (Days)
Payethylene (vacuumized)	3.0	0
	1.0	0
	0.0	0
Cryovac (vacuumized)	3.0	13
	2.0	11
	1.0	10
	0.5	3
	0.0	2

*Dipping time, 30 sec., sample weight, 500a.

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in Cryovac. This can probably be attributed to the latter film's decreased permeability to water vapor—a theory supported by the fact that overall weight losses were greater for the potatoes packaged in polyethylene than in Cryovac.

Of practical concern, too, are relative keeping qualities of pre-peeled French fries (treated with either sodium bisulfite or ascorbic acid solutions) after the original Cyrovac package has been opened and a portion of the contents used.

Consequently, potatoes were dipped for 30 sec. in solutions containing 0, 100, 300, 600, 1,000 and 2,000 ppm. of SO_2, and for 60 sec. in solutions of 0.5, 1.0, and 2.0% ascorbic acid. After 500-g. portions were packaged in Cryovac bags as before, samples representing each treatment were opened and stored both at room temperature (80-85F.) and under refrigeration (35-40F.).

In both cases, discoloration appeared in all packs within an hour.

These results suggest two alternatives for the processor of pre-peeled potatoes: First, he may continue to package French fries in a single large unit, such as a 30-lb. bag. The consumer, upon opening the original Cryovac package would have to transfer into cold water or a dilute salt solution all potatoes not to be cooked immediately. This might prevent discoloration of the unused portion.

Second, the processor could determine the capacity of his customers' fryers, and package just this amount in individual bags. Transferring the entire contents into the fryer would obviate the need for intermediate storage, with its attendant inconveniences.

A number of these Cryovac packages could be consolidated into a single master container, such as a 30-lb. kraft bag, which would withstand storage at 35-40F.

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The above article is taken from the authors' paper "Preservation of Pre-Peeled French Fry Style Potatoes in Plastic Films" (Contribution No. 1068. Massachusetts Agricultural Experiment Station).

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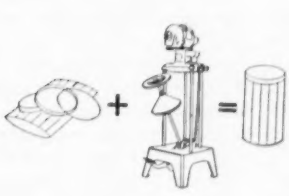

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Building Insulation Life Into Refrigerated Units

Studies made on several types of insulating materials and constructions point up weaknesses of many erecting procedures. Emphazied are values of properly applied vapor barriers and adequate density of materials.

PART I—VAPOR BARRIERS, GLASS, WOOL*

EDWARD SIMONS,
Consulting Engineer, San Francisco

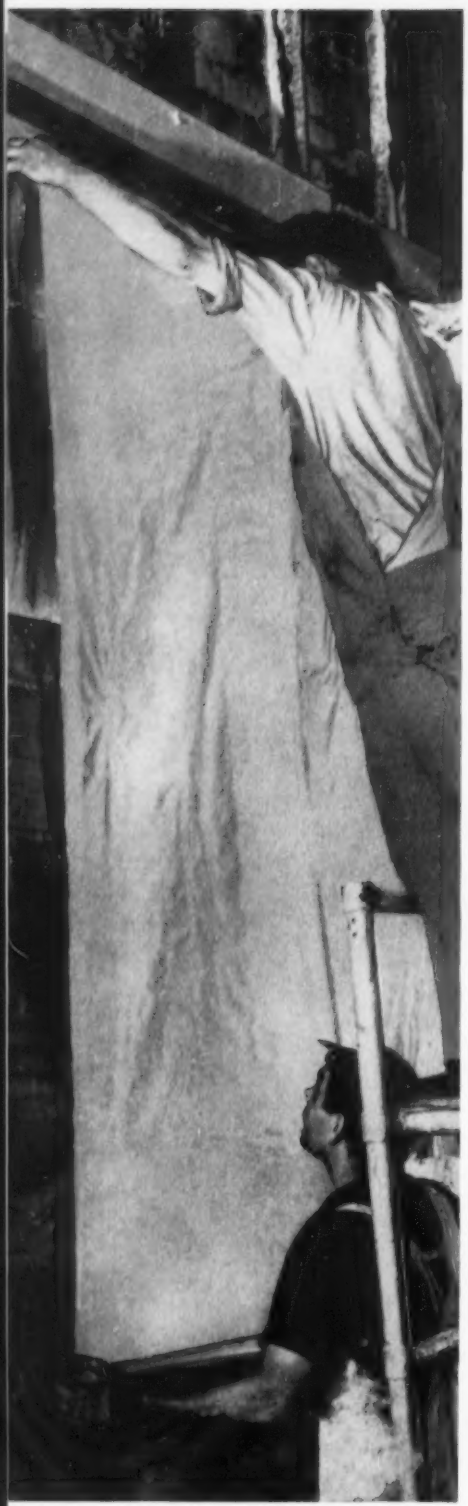

FIG. 1. BALLOON ENVELOPE method of applying the vapor barrier, where top is fastened by adhesive tape, obviates tearing by fasteners.

INSULATION is our No. 1 weapon for defeating nature in her continual efforts to degrade temperature.

The truth is that heat flows downhill. Therefore, insulation must be built into your structure around refrigerated spaces or equipment in order to provide a defensive wall against heat flow from the higher ambient temperatures.

In the design of such structures, the following seven pointers should be carefully considered:

1. Select an insulating material, or materials, satisfactory for the purpose to be accomplished. Several types of insulated construction may be desirable and economical in a single installation.

2. Install a vapor barrier which will not leak water vapor and operating dollars.

3. Use wood with care. It is a fine structural material, but being hygroscopic, its reactions to moisture must be respected.

4. Consider close and accurate field inspection and supervision as a necessary cost and a good investment.

5. Use caution in the matter of uninsulated freezer floors on the ground.

6. Where insulated freezer floors are used, provide means for heating to preclude formation of ice lenses.

7. Use fill or fibrous materials at a proper density for economical operation.

Industrially, the basic insulation is still air—that is, air that's free from convection and radiation effects. Heat transfer would then be by pure conduction with a k (thermal conductivity) of 0.168 at 32F., and 0.221 at 212F. Here, k equals Btu./hr. sq. ft. deg. F./in.

Practical insulation in large structures, however, requires building-in of materials in a manner and system that will best approach the requirements for minimum heat transfer. At the same time, suitable qualities must be maintained in the components throughout life of installation.

Good Vapor Barrier Vital

One of the most important components of an insulated structure is the vapor barrier. In a refrigerated space cooled by coils, pressure of water vapor at the coil surface is that of saturated air at the temperature of that surface. Exterior to the insulated and refrigerated space, dew point of the ambient air establishes the vapor pressure.

When surface temperature of coils is below the dew point of the exterior ambient air, the vapor pressure differential tends to cause a vapor flow through the insulated structure to the "sink" of the coils. The vapor barrier construction must control this flow, which is independent of air pressure. In addition, Munters[1] has pointed out the possibility of hygroscopic travel and capillarity, factors which may involve storage and backsoaking of moisture in the insulation.

In selection of a vapor barrier, it is well to consider the following six points:

1. Permeability of the material itself.

* Concluding Part II, covering Corkboard, Wood, Redwood Fiber, Reflective Insulations, and Proper Floor Construction, will appear in March FE.

Technique and Closups of In-Place Wall Tests of Glass Wool

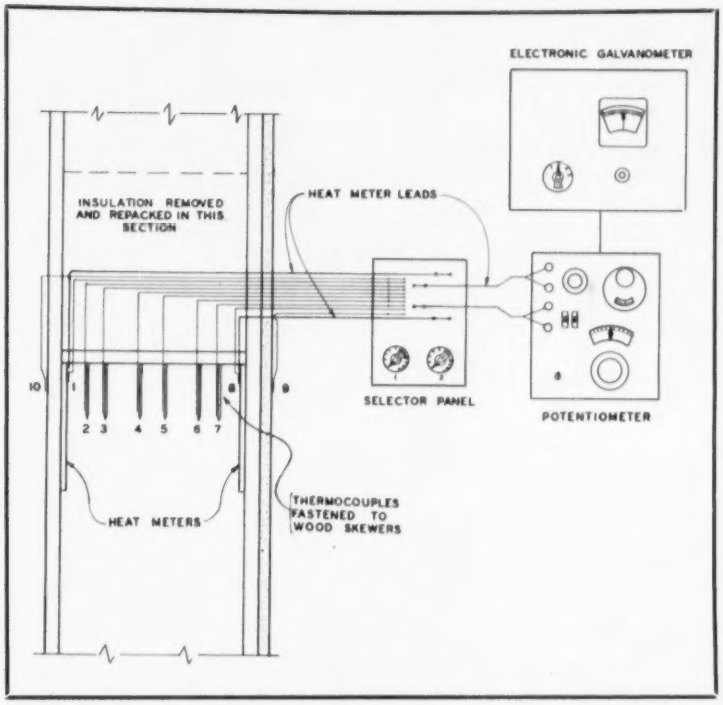

FIG. 2. SMALL CAVITY is cut from insulated wall to allow placement of heat meters and thermocouples in fill. Potentiometer has special electronic galvanometer that allows fast, accurate adjustments and readings.

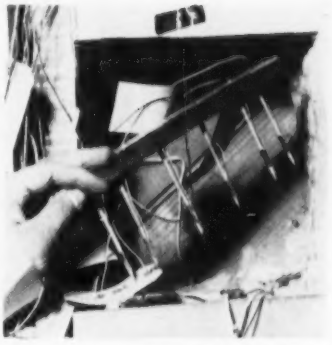

FIG. 3. THERMOCOUPLES are placed across the insulation to establish temperatures at various positions. Maximum spacing should not exceed 20% of total insulation thickness.

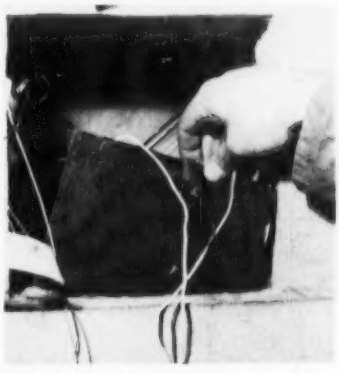

FIG. 4. HEAT METERS are placed behind undisturbed glass wool insulation, at inner and outer walls.

FIG. 5. HEAVY ICE BUILDUP was observed in insulation removed from one socket in ceiling of test room.

2. Ease and surety of application.
3. Necessity for multiple layers to offset human error.
4. Means of attachment to structure.
5. Methods of penetration, including nailing.
6. Effects of pulldown, heating up, and vacuums.

Vapor Dams Cut Effective Thickness

An insulated wall may be built so that it will have practically no vapor dam build-up, provided it has a very efficient exterior vapor barrier. As this barrier is reduced, moisture flow will increase. Wood is a material which is rather resistant to vapor travel, and water vapor encountering and passing through it will condense, then be re-evaporated on the other side. If this passage does not take place at a sufficient rate, vapor dam formation will develop and probably become progressively worse.

Other materials, such as Portland cement plaster, metal linings, tile finishes, etc., form effective vapor dams. With good vapor barrier construction, it is possible to utilize materials with vapor-dam characteristics as interior finish and liners.

In fill materials, such as redwood bark fiber, extensive tests[2, 3] have shown that an ice layer in a freezer merely decreases the effective insulation thickness, without, however, decreasing average insulating value of the remaining material. On the other hand, moisture penetration in a 7-in. cork insulated structure had the effect of reducing equivalent insulating value to 5¼ in. in 6½ yr.

It is reasonable to assume that leaks and openings that occur in a single layer of vapor barrier paper are largely due to installation methods, fastenings, errors, etc. A second layer probably wipes out a great part of the deficiency.

Recently, however, a new material has been developed which may be safely applied in a single layer.[4] This is a laminate—Mylar polyester film, which provides flexible strength, laminated to aluminum foil, which provides moisture impermeability. The material has been satisfactorily produced with thicknesses of ¼ mil Mylar laminated to each side of a 1 mil thickness of foil.

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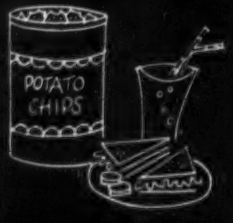

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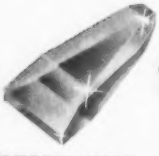

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Mylar reinforces the foil, thus precluding vapor leakages that might occur if the foil were used alone. Of course, it is most important that the foil be controlled with respect to pinholing during lamination, since this defect is one of the drawbacks of thin aluminum foils. However, the laminate is available under supplier's guarantee of the maximum permeabilities stated.

The Balloon Barrier Envelope

If the vapor barrier depends for its attachment on staplings and various penetrating fastenings, the great pressure developed during pulldown to refrigerating temperature may well disturb these fastenings. This could cause leakage of moisture into the insulation before it has really performed.

If the barrier is applied with a minimum of penetration fastenings, a better insulated construction will result. Thus, top end of wall sheets may be fastened with an adhesive, with balance of sheets flowing freely, but neatly and snugly, down the wall and around bottom of insulation into floor vapor barrier.

It is in this manner that the "balloon" vapor barrier envelope is developed. Then, gas law pressure variations and adjustments may take place without tearing of staplings and other fastenings. A similar method and reasoning holds for ceiling installations. Fig. 1 shows application of this barrier.

Vapor Barrier Costs

One reason for the excellent results with cork insulation is the vapor barrier effect of the hot asphalt applications, first against the receiving surface and then in the second layer of hot-dipped application.

Where materials of a different type are used, an effective vapor barrier may be established with reliable materials. However, a point is reached where further cutting of costs only invites failure and disaster. Price reduction by the elimination of vapor barrier quality is a false measure of competition.

On the basis of today's prices, a satisfactory barrier will have a minimum cost of 12 to 15c. per sq. ft. in place. Where certain basic barrier materials are cheaper than others, a safe barrier will still build up to this price when the proper number of membrance layers and sealing coats are applied.

Fibrous and Fill Materials

In a chimney and furnace system, combustion is maintained by circulation due to difference in densities of cold feed air and warm products of combustion. Similarly, warm air at exterior face of a fibrous or fill-insulated cavity is pushed upward by the heavier air along the interior, refrigerated face. This convection effect should be of great concern in the design of insulated structures.

Another type of convection develops when there are punctures, ever so slight, in the vapor barrier.[5] Exterior air will pass through them and circulate in the insulation. Furthermore, air currents within a refrigerated space are subject to thermal and fan-forced circulations.

In some cases, movement of air has been determined to be as high as 8 cu. ft./hr./sq. ft. With moisture balance condition for wood at 6% at the vapor barrier, relative humidity would be about 30% for an air temperature of 70F. Above-mentioned volume of this air would represent a weight of about 0.6 lb. at a specific heat of 0.24.

Consequently for each degree of temperature reduction, it would yield in sensible heat alone about 0.14 Btu./hr. Thermal conductivity at the convection zone would then show as about 0.30+0.14=0.44, an apparent increase of 46% due to very slow movement and chilling of the air.

Glass Wool Studies

An excellent insulating material is glass wool that's properly used in relation to structure and attendant temperatures. Queer and McLaughlin,[6] concluded that convection was negligible when density of the material was 6 lb./cu. ft. The in-place test values were reported at k=0.22, considerably below values usually published for this material.

In 1955, a series of in-place tests[7, 8] were performed on a freezer in operation for about one year. It was insulated with 11½ in. of glass wool weighing an average of 1.59 lb./cu. ft. Structure above canopy was subject to solar load. Interior lining was plywood, and the glass wool was packed in the cavity and between studs and joists. In the ceiling near the wall a solid row of blocking separated wall and ceiling spaces. In the ceiling the interface value of the thermal conductivity k_i is 0.23.

An interesting point is that the exterior roof temperature at one socket was less than the temperature of the meter inside the roof. This indicates a convection flow from the hotter field of the roof toward the sink of the wall-ceiling intersection. Heat flow along the roof sheathings, and through blocking and joists, evidently allowed depressing of the roof temperature. The roof-side meter actually showed heat flow to the exterior.

As thickness of an insulating air space is increased, with heat flow downward, convection increases.[7] Indications are that, at 100 F difference across a space from 10 to 12 in. wide with heat flow downward, free convection in an air space might increase heat transfer to four times that of pure conduction.

The lightweight glass wool offers some resistance to air movement, but in view of the heavy convection developed in the walls, the writer must conclude that ceiling convection is an extremely important factor.

In the walls, the steadiest condition was found at an elevation of 10 ft. 6 in. with mean of interior and exterior conductances and the Fourier mean k_F (determined by the following equation) very close:

$$k_F = \left[\Sigma \frac{(Q_{ext} + Q_{int}) \times L}{2(T_{ext} - T_{int})} \right] \div n$$

where Q = heat meter flux, Btu./hr., sq. ft.; L = insulation thickness; T =

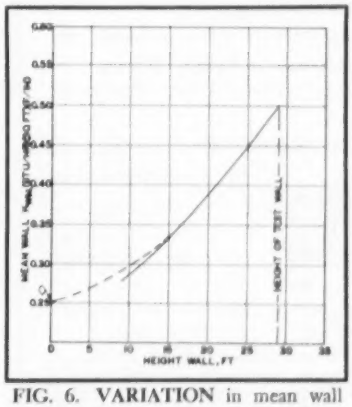

FIG. 6. VARIATION in mean wall conductivity due to convection in lightweight (1.59 lb./cu. ft.) glass wool insulation. Wall thickness 11½ in.

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temperature, deg. F.; ext. = exterior; int. = interior; and n = number of tests.

This value uses mean of two heat meter fluxes at each station across insulated thickness of wall under overall temperature driving force across insulated thickness, determined for each test time. Mean of all such values, determined for a valid cycling period, is then used as the Fourier mean value for the insulation at the test location.

Convection Currents

The lightweight glass wool showed very rapid response to temperature changes, due to slight heat-storage. At the bottom of the wall, the state was unsteady and distorted due to movement of cold convection currents. Fig. 2 shows arrangement of test equipment; Figs. 3 and 4, placing of thermocouple and meter system in wall sockets; Fig. 5, heavy ice buildup at a socket in the ceiling.

Where chimney convection is present, expectation is that warmed air would rise on the warm side and then return down the cold side, with moisture in the moving air deposited as ice in an air conditioning process similar to that occurring when air is passed over cooling coils. In the above case, ice was thickest at top of walls and tapered off until there was none at the 10 ft. 6 in. or 4 ft. 5½ in. sockets.

Where convection occurs, outer meter will show heat flow from exterior directly into the meter. Inner meter will show flow from cavity into meter, including convection flow. In tests of this nature, use of an inner meter is imperative.

For the wall and exposure under consideration, the local Fourier mean value for the wall appears to follow the equation:

$$k_F = 0.23 + \frac{h^{1.5}}{230}$$

where h is the wall height to the local point in feet. In the test case, total wall height was about 29 ft. This equation, integrated for the mean, yields the equation for k_{WM} (mean thermal conductivity) of the complete wall up to height h

$$k_{WM} = 0.23 + \frac{h^{1.5}}{575}$$

Fig. 6 (from Rowley et al[8]) shows a plotting of the integrated equation, giving effective wall conductivity which actually includes effects of conduction and convection.

Dashed line at the lower terminator deflects into $k=0.25$ for a wall height of 0 ft. Value of k_{WM} at 0 height is 0.23. Weather was quite consistent through the test days (July 26-Aug. 11), and variation in the sun's altitude was only 4 deg.

Indicated by Fig. 6 is mean wall value for thermal conductivity over height of wall *below* reference height of horizontal scale. It *does not* indicate mean value for a full wall of the heights shown. However, until further tests are performed on walls of varying heights to determine effect of *total height variation*, a designer may well be justified in using the value of 0.50 for the mean wall thermal conductivity.

Heat leaks on walls and deep roof insulations may be 100% higher than values calculated from thermal conductivities based on laboratory-guarded hot plate tests. If principal refrigeration load is from heat leak and service usage, deficiency in calculation may be very serious.

There appears to be no doubt that the orientation of fibers of glass wool is very important. However, if the fibers are oriented to preclude cross-flow of convection currents, they may be in a position to allow very active convection currents.

McAdams[9] shows that, for a given temperature difference, conductance for a vertical enclosed space varies *inversely* as the 1/9 power of the height. For a free wall space of given clearance, convection appears to *decrease* with increased wall height. Of course, the effects of "solar pumping" will vary in differing installations.

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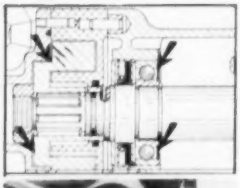

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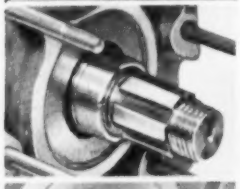

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RESEARCH PANEL REPORTS new objective quality tests for frozen foods in storage and distribution, at frozen foods convention. New findings as to causes and rates of deterioration also were revealed. From Western Utilization Branch, USDA, Albany, Calif., panelists are (l. to r.): W. F. Talburt, E. F. Jansen, and Miss Helen L. Hanson. Moderator, standing, is W. J. Hart, Jr., chief technologist, John H. Dulany & Son, Inc., Fruitland, Md.

Reveal Objective Tests For Frozen Food Quality

Analyses for vitamin C, chlorophyll, sugar, and color-spread tell how much products are abused. Easy temperature check found

FRANK K. LAWLER
Editor, "Food Engineering"

HISTORY-MAKING PROGRESS has been made in the long struggle to develop objective quality evaluation of frozen foods. Important new "tools" now are at hand to help curtail deterioration by excessive temperatures in storage and distribution.

Revealed by a panel of researchers at the National Frozen Foods Convention in Miami Beach last month, the new information comes from studies at Western Utilization Research Branch of USDA, Albany, Calif. In summarizing the information, M. J. Copley, of WURB, emphasized these points:

Combinations of excessive temperature and time in distribution produce significant changes in quality—changes often great enough to cause consumer complaint. How to measure the amount of this abuse suffered by a product, and determine how much high quality life remains, is illustrated by the findings for strawberries.

For this product, the amount of ascorbic acid (vitamin C) and its oxidation products are measured. Handled properly in harvesting and processing, freshly frozen strawberries contain about 98% of the original ascorbic acid. When about 6% more of the acid is lost, off-flavor and discoloration will begin to be detected by a taste panel. And if the product is held at 20 deg. F., that point is reached in 6 to 13 days. After 4 to 6 weeks at that temperature, color and flavor are bad enough to cause consumer complaints, the ascorbic acid loss being 25%.

So a chemical test for the acid reveals how much the quality has deteriorated. And the determination can be made anywhere in the distribution chain.

It is not even necessary to know how much ascorbic acid the berries contained originally. For the sum of the acid and its first two oxidation products remains constant.

The same objective test can be made for raspberries. But it is more convenient to measure the extent to which the red color of the berries is equalized out in the syrup.

For peas and beans, the handiest quality indicator is the ratio of the chlorophyll to the Pheophytin.

A thaw index for frozen fruits has been discovered, too. After a day or two of defrosting, sugar concentration in the syrup is the same as in the fruit. Normally, the former is higher.

With this information known, Dr. Copley pointed out, it is possible to work out industry standards for quality at each distribution point.

These objective tests also reveal how long the product has been held at too high a temperature. If made at each step along the distribution way, they would put the finger on the spot at which the abuse occurred. And they could be used by the next in line for protection against an inferior product.

Time and temperature are the twin troublemakers, Dr. Copley emphasized. Even a 5-deg. rise makes a big difference in rate of deterioration—2- or 3-fold, sometimes as much as 5-fold.

What is more, each additional 5-deg. rise multiplies the effect. That is, if one 5-deg. rise speeds the change 3-fold, 10 deg. will make it 9-fold, 15 deg. 27-fold.

Letting some items warm up to 25 or 30 deg. for one day is worse than storage for a year at zero.

Urging freezers and distributors to try for zero temperature in every step of distribution, Dr. Copley made this significant point:

Zero itself is a compromise, not an impractical ideal. Changes in quality would be still slower at −10 deg., and no measurable changes have been detected in 2 years at −20 deg. (*Turn to page 147*)

ONLY BY THE UNFORGETTABLE GOODNESS OF ITS FLAVOR can manufacturers of summer fruit drinks, nectar bases and soft drink powders hope to build popular and increasing demand for their thirst-quenching products. And since flavor contributes so importantly to their success we are proud, indeed, that so many leading brands derive their appeal – in part, at least – from flavoring specialties of our manufacture. Remember: *Your product is* ONLY *as good as its* FLAVOR!

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Financial Aid to Higher Education

A Fine Start, But...

This editorial has two purposes. The first is to salute American business for the fine start it has made in helping to relieve the financial plight of our colleges and universities. The second purpose is to stress the importance of having business provide more financial aid, and soon.

How Business Helps Higher Education

Business contributions to higher education doubled between 1950 and 1955. They jumped from $40 million to $80 million. Preliminary figures indicate they will be even higher this year.

Business firms have also shown a lot of ingenuity in devising different ways of making their contributions. The methods range from a matching of an employee's contribution to his particular alma mater to wide diffusion of the money through state and regional money-raising associations of colleges and universities. Thanks to this ingenuity, business firms now have a wide choice of ways by which to give effective aid. The way most appreciated by college administrators is the making of gifts unrestricted as to the purpose for which the money is used.

Imposing as it is, however, what business has done thus far is only a good start. Only a tiny fraction of the total number of business firms in the country are giving direct financial help to our colleges and universities; and this fraction includes fewer than half of the hundred largest corporations in the country. Also, the amount of financial help being provided by business constitutes only a very small fraction of what is needed.

Why Colleges Need More Aid

Right now our privately endowed colleges and universities need about $350 million more in operating income a year than they are receiving to enable them to pay decent faculty salaries and be in tolerably good working order otherwise. The reasons, including a severe decline in the purchasing power of their endowment income because of price inflation, have been dealt with in the previous editorials in this series.

In addition, these institutions, together with the tax-supported schools, are faced with a tremendous increase in enrollment over the years ahead. With both a rapidly increasing population of young people and an increasing propor-

tion of them going to college, this year's enrollment of 3.2 million students is expected to reach 4.0 million by 1960, and to be doubled by 1970.

For the next ten years our privately supported colleges and universities must have an average of about $400 million a year above what they can be expected to collect from tuition fees, income from endowment funds, etc.

This figure of $400 million does not include what is needed for new buildings and equipment. It also does not include help for tax-supported schools above what they get from taxes, fees, etc. Business has given and will continue to give these schools substantial aid. Indeed, almost 25% of the financial help from business for our colleges and universities went to tax-supported schools in 1955.

If aid from business met their needs for increased operating income, the privately supported colleges and universities would be given a decisive lift in performing successfully their part in our system of higher education. They would still have large needs of capital equipment — buildings, dormitories, laboratories — but help from other sources, such as that provided by devoted alumni, where they are well organized, could be expected to go far toward meeting these needs. Also some companies prefer to concentrate on meeting needs of this type.

What 1% of Profits Would Do

But do business firms have the capacity to fill the gap in adequate operating income for our privately endowed colleges and universities without putting an excessive financial burden on themselves? Those who have studied this capacity carefully say that the answer clearly is yes. If, of its profits before taxes — last year an estimated $43 billion — business were to devote 1% to helping our privately endowed colleges, it would take care of present operating needs of about $350 million a year. And the balance of $80 million would be a big step in meeting their needs for new buildings and equipment, too.

About one half of a 1% contribution of this sort would, in effect, be made by the federal government. Up to a limit of 5%, contributions of this type are exempt from the federal corporate income tax. For corporations with incomes above $25,000 per year this tax is 52%.

It is clear that not all business firms are in shape to devote 1% of their profits to aid to higher education. Even in this year of record-breaking prosperity, many of them will have no profits at all. But if business generally would take 1% of pre-tax profits as a target or benchmark for financial help to our privately endowed colleges and universities these institutions would again have sturdy financial foundations.

Relatively this is a very small price to pay (1) to insure a continuing supply of competently trained young men and women and (2) to buttress our freedom by assuring the successful survival of the privately supported sector of our system of higher education.

This is one of a series of editorials prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C. McGraw

PRESIDENT

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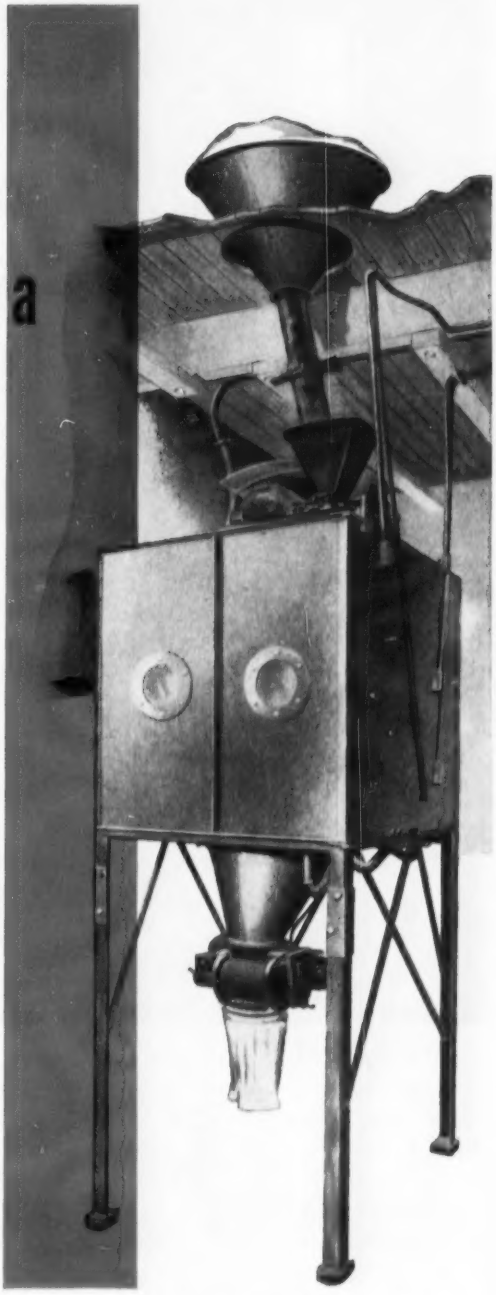
Mikro-D Installation at A. N. Stollwerck grinds and collects sugar in efficient, economical, straight-line operation!

Specialists in chocolate products for more than 80 years, A. N. Stollwerck, Inc. serves leading candy makers, ice cream companies, and bakeries across the country. Quality is important to Stollwerck, and economy as well . . . two factors that led to selection of MIKRO-D equipment for their sugar grinding process.

While the arrangement of the units shown here offers a fine example of the flexibility of MIKRO-D equipment, production figures tell an even more pertinent story—utilizing only a 15 h.p. motor, the MIKRO-D installation continuously produces 2000 lbs. of freshly-ground sugar per hour, with a fineness of 90-95% through 200 mesh!

MIKRO-D equipment—individually engineered to do a specific job—can put similar efficiency and economy into your pulverizing and collecting operation. Arrange to send us a sample of the unground product. We'll be glad to make test runs to your specifications . . . and submit laboratory findings and recommendations, entirely without obligation.



MIKRO-D units at Camden, N. J. plant of A. N. Stollwerck, Inc., consist of a #2 MIKRO-Pulverizer mounted directly on top of a 24-1-36 MIKRO-COLLECTOR, with 8" MIKRO AIRLOCK. Unground sugar is easily poured into a hopper from floor above, to be carried through the pulverizing and collecting process.

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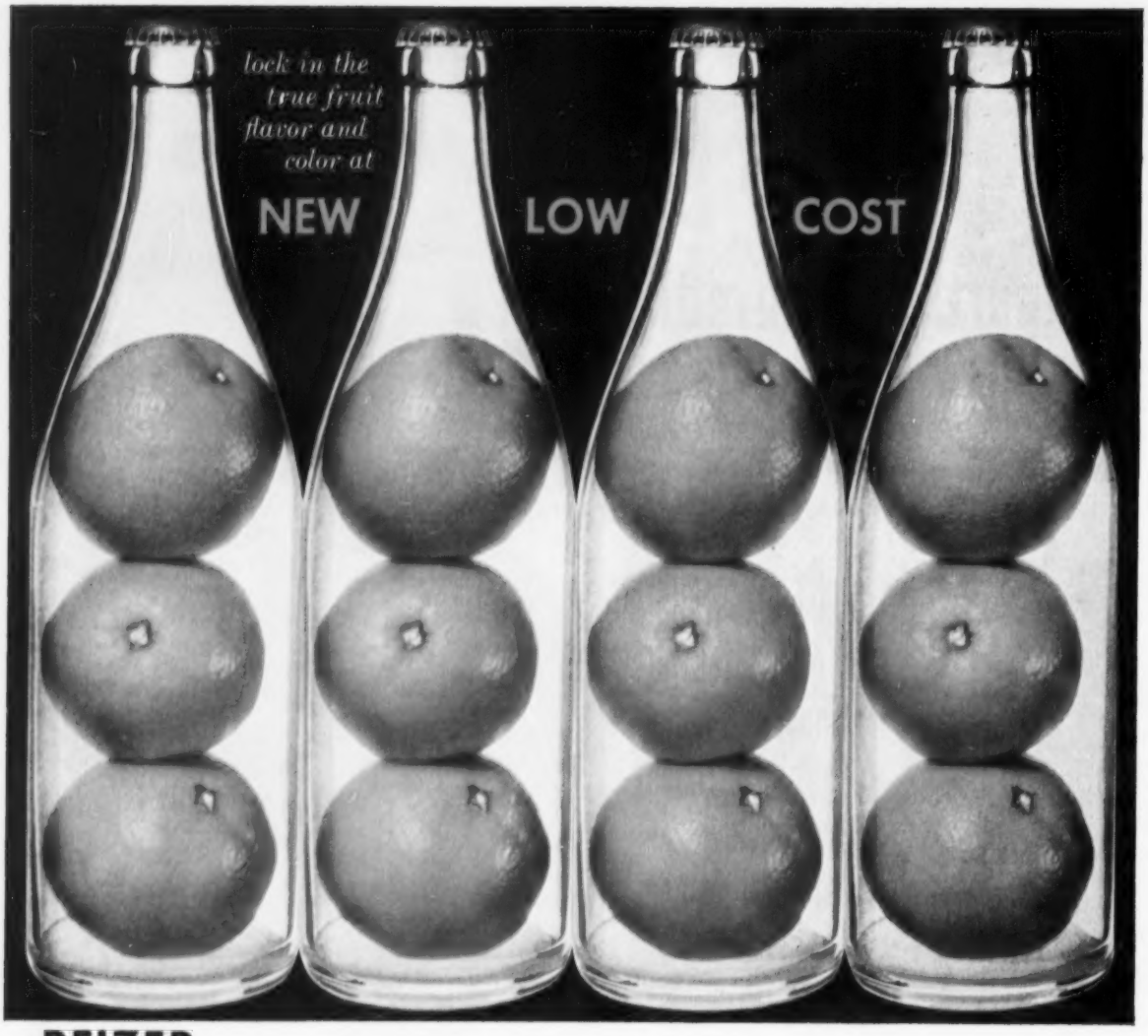

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KEEPING UP WITH THE FIELD

Sugar Shields Rayed Food

Sugars—such as sucrose, glucose, and fructose—can completely protect pectins from breaking down under gamma radiation, declare scientists at the New York State Agricultural Experiment Station, Geneva.

The discovery, sponsored by the Quartermaster Corps, may have far reaching affects on radiation preservation of fruits and vegetables. For, in previous work with these foods, they have shown a marked tendency to soften and lose firmness and texture when exposed to gamma rays.

US Coffee-Sippers Bested

The United States, which consumes well over half of the world's green coffee, ranks only second place on a per capita basis, according to the Pan-American Coffee Bureau.

Each American drinker quaffs the brew from 15.8 lb. of green coffee. However, the java-loving citizens of Sweden toss off the equivalent of 16.1 lb.—despite the fact that coffee costs $1.50 per lb. (retail) in the Scandinavian country.

Ice Cream Shifts to ½-Gals.

The swing toward putting ice cream in half-gallon containers may lead this economy size to outstrip pint cartons in number of units before the end of '57, predicts the Paraffined Carton Research Council.

Half-gallon sales have climbed 25-30% per year since '52, and hit a peak of 470,000,000 units in 1956. Last year, ice cream men moved about 660,000,000 pint cartons.

USDA Speeds Spice Test

A new technique for determining volatile oil content of spices cuts testing time in half and boosts accuracy.

The method, developed by USDA's EURB in cooperation with the American Spice Trade Assn., employs a magnetic stirrer and redesigned Clevenger trap.

Opponents Still Far From Settlement In Legislative Food Additives Battle

Efforts are already being pressed for a new round of Congressional hearings on controversial food additives legislation—with the opposing sides apparently still as far apart as they were in '56.

Rep. J. P. O'Hara (Rep., Minn.)—who carried the ball for the food trade associations last year—has now introduced a new bill (H. R. 366) for close regulation of all chemicals added to food products.

It is very similar to the last Congressional measure, but does come closer to FDA's ideas in the "grandfather clause" (the section attempting to exempt those food additives already in common use from further testing for safety).

The new bill, however, still clings to the declaratory judgment trial procedure, whereby manufacturers can challenge an adverse FDA decision on a chemical in the courts—a section bitterly fought by FDA in the '56 hearings.

Also, the O'Hara bill would require no proof of the functional value of a proposed food additive, if the quantity used threatens no harm to consumers.

FDA, on the other hand, strongly urges that proof of functional value be incorporated in any mandatory pre-testing legislation passed by Congress. Also, the Agency intends to press for legislation covering nuclear radiation treatment of foods.

Boosts Oil Extraction

Separation of pure olive oil from the crushed fruit has now been boosted to 97.7% efficiency by a process employing an electric charge, discovered by Professor Salvatore Castoina of the Olive Growing Experiment Station, Pescara, Italy.

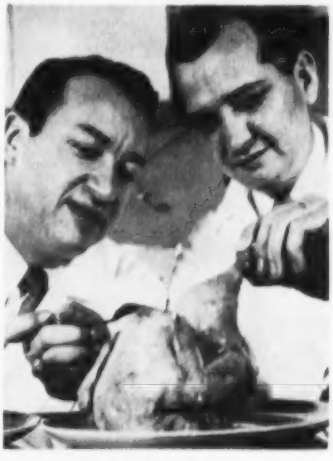
After crushing olives into a fine paste and adding water, an electric current is passed through the mass for 20 min. Solid material settles out and oil forms a distinct layer on top of the water. It can then be easily drawn off for further processing.

Amount of electric power needed for the revolutionary technique is only half that required to drive a standard hydraulic press.

Lift for Corn Research

Fundamental research in carbohydrates will get new impetus in '57 from 20 grants, made to various colleges and universities by the Corn Industries Research Foundation, Inc., Washington, D. C.

The fellowships, totalling $202,500, will attempt to pierce some of the mysteries surrounding carbohydrate chemistry, corn components, and other related subjects.



Eyes A-Rayed Poultry

"Pasteurized" chickens — bombarded for five hours with gamma rays—have double the shelf life of birds stored under conventional methods, according to researchers M. Steinberg (left) and J. McGill of the U. of Illinois. Furthermore, a panel of 10 testing experts could not detect any difference in flavor between the chickens subjected to A-rays and poultry held under usual refrigeration. The testers seek to find a way of avoiding the off-flavors produced in many foods by 'sterilizing' doses of gamma rays.

Poultry Inspection Dispute Dims Chance of Law in '57

The fight for mandatory government inspection of poultry was an early arrival in congressional bill hoppers, as the 85th Congress swung into session last month. But, the same bickering over who will get the inspecting job that killed legislation last session has already dimmed chances of enactment this year.

A new Senate bill, sponsored by Senator J. Williams (Rep., Del.), would leave inspection up to the discretion of the Secretary of Agriculture. Reputedly, Secretary Benson would toss the job to AMS, which already handles the voluntary program.

But, another bill, backed by FDA and organized labor (and introduced by Rep. L. K. Sullivan of Missouri), seeks to give the compulsory task to USDA's meat inspection branch.

Jurisdiction in the dispute over which USDA group will eventually take over has now been transferred from the Senate Labor and Public Welfare Committee (which held hearings last year) to the Senate Agricultural Committee.

Starts Giant Desalter

Pure water is flowing at the rate of 86,400 gal. per day from a giant-output electrical desalting plant at Bahrain, on the Persian Gulf. Dwarfing smaller installations, located in scarce-water parts of the U. S., this new unit supplies drinking and cooking needs of a community of 5,000 people.

Input water comes from wells, drilled within sight of the Persian Gulf, but containing only 1/14th as much salt. This water (3,100 ppm. dissolved solids) is passed through a series of 15 machines, containing plastic membranes (Ionics Inc., Cambridge, Mass.) An electric charge (5 kwh./1,000 gal.) separates dissolved ions. Final product has less than 450 ppm. solids.

See New High in Food Sales

Retail men predict a 6.7% gain for food sales in 1957, with consumers continuing to clamor for food products having built-in maid service, according to the National Assn. of Food Chains.

In 1956, sales jumped 7.4%. And 6,000 new products were launched to satisfy the housewife's appetite for work-saving preparations.

Wins "Best Flexible Package" Award

The President's Award for best flexible package of 1956, presented by the National Flexible Packaging Assn., goes to Quaker Oats Co. for its Aunt Jemima Corn Bread Easy Mix. Shown admiring both award and the new product are (left to right) R. P. Einwalter, Quaker Oats corn goods advertising supervisor; P. B. Warner, grocery products advertising manager; and M. F. Lynch, product sales manager.

Mezzanine Ups Oil Output

Addition of a mezzanine floor has streamlined packaging and shipping of essential oils at Ungerer & Co., N.Y.C. Bottles now travel from weighing and filling (left) to labelling (center) and casing (right). Boxes then chute directly to street-level shipping floor (bottom). Method replaces a fourth-floor packaging room that necessitated handtrucks, elevators, and extra hand labor.

US Second in Fish Catch

Latest complete figures show that the United States rates No. 2—right behind Japan—as a fish catching nation, according to the Food & Agricultural Organization of the United Nations.

In 1955 the annual bag hit 2,687,000 metric tons. And while this was slightly smaller than '54 figures (2,706,000 tons), the general trend during the past few years has been even higher, states the world-wide organization.

ICC Approves Freight Hike

Freight rates have jumped 7% on Eastern railroads, 5% on Western carriers, following ICC approval of an emergency boost sought recently by the trainmen.

The increase is entirely separate from a pending petition by the railroads for an additional 15% hike, which is now under study by the Commission.

Meanwhile, Southern railroads, who have not benefited from the new rates, have their own petition before the Interstate Commerce Commission for consideration.

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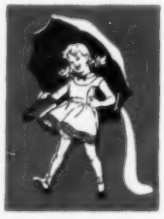


Reactivated FDA Group To Eye Food Problems

FDA, buoyed by additional funds, has reactivated its long-dormant Foods Standards Committee, which acts as an advisory body to the Administration. And Commissioner Larrick invites "consumers, officials, and members of the food industry who have suggestions for consideration" to submit them to Joseph Callaway, secretary of the six-man group.

The Committee last met about three years ago. Now it plans to hold its first new meeting probably late this month or in March. Problems to be covered will be those requiring immediate attention. Among these is sure to be the formulation of Standards for fruit juice concentrates —a subject that was under discussion, but not concluded, when the Committee was last active.

Food Spending Hits High

Consumer expenditures for food in 1956 topped $70-billion—a $3-billion jump over 1955 figures, declares Paul S. Willis, President, Grocery Mfrs. of America.

On the long-range view, he states that his prediction of a $100-billion food market by 1965 still stands. Greatest factor of strength for this future growth, he concludes, is the continued climb of family income, which leads to larger food budgets.

Flow Rate Tied to Off-Flavor

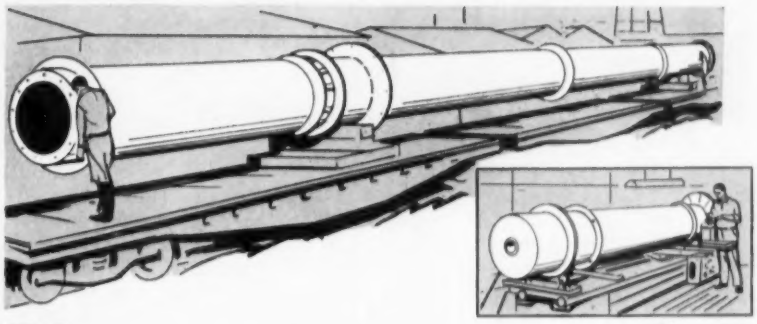
Solution to the problem of "buttermilk" off-flavor in citrus concentrates is a step nearer reality through a study recently completed by Continental Can Co.

Researchers at the company's Chicago Development Center have uncovered the fact that variations in flow rate in the fresh citrus juice change both the population density of Lactobacilli and their production of diacetyl—the chemical compound responsible for the off-flavor.

USDA Sets Sugar Quota

Preliminary quota of 8,800,000 short tons (raw value) has been announced by USDA for continental U. S. supply in '57. This contrasts with an initial 1956 quota of 8,350,000 tons, currently adjusted to 9,000,000 tons.

The new allotment is expected to satisfy normal domestic requirements.



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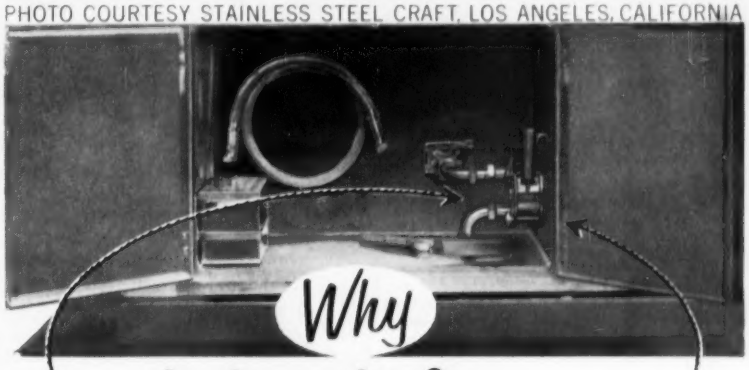

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FDA Will Monitor Foods, Seeks Data On Radiation

Preparing for future atomic processing, FDA is starting a continuous surveillance of some 15 food items to determine what constitutes a normal level of radiation.

Three general groups of foods will be investigated: 1, Raw agricultural commodities, including wheat, potatoes, dried fruit, and fluid milk; 2, simply processed canned foods; and 3, bread, chosen as a food fabricated from several different ingredients.

Studies will be conducted in Washington, D. C. under a team of experts headed by Dr. Edwin P. Laug, FDA's Physiochemistry Chief. Biggest block at the moment is the scarcity of samples from pre-1945 packs.

Therefore, FDA may have to settle for foods canned since the birth of the atomic age.

Calls for Safety Training

Accidents cut heavily into dairy profits and hurt community relations, stressed P. R. Ellsworth of the Milk Industry Foundation at a recent Dairy Industry Conference, U. of California.

A $100 repair bill for a wrinkled fender, he continued, represents the profit on 20,000 qt. of milk. But that doesn't count the goodwill, lost in any accident involving a dairy truck. Mr. Ellsworth concluded by emphasizing the need for increased safety training among driver-salesmen.

Bruise-Free Fruit Shipper

Striking results in bruise prevention have been attained in shipping California pears by using a jumble-pack—secured with a simple pad laid over the fruit.

The pad, an inexpensive kraft paper envelope filled with shredded paper, appears to stop vibration of fruit in the entire carton. The jumble-pack method, in which non-wrapped fruit are placed in the cartons without regard for a pattern, shows promise of greatly reducing shipping costs.

Further tests on the revolutionary style of packaging are being conducted by N. F. Sommer, a pomologist at U. of California, Davis.

Sun-Power Food Drying

Solar energy may be applied in food processing to dry candy, as a result of research now being conducted by Stanford Research Institute for the Commonwealth of Puerto Rico.

The Institute is now studying the feasibility of an experimental, 1,000-sq.-ft. solar air heater. If it proves economical, the scientists will develop engineering data from which a commercial installation can be built. Puerto Rico is interested in substituting its abundant sunshine for expensive fuels, which are presently all imported.

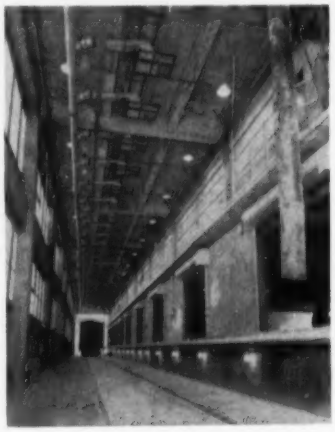
Fungistat Protects Cakes

Baked goods protected by a selective food fungistat (Sorbic) had double the shelf life of similar, control foods in a recent experiment conducted by Union Carbide & Carbon Corp.

In the tests, conducted on marble cake, the inhibitor prevented mold growth for 9 to 13 days. The control samples became moldy in five days.

The quantity of Sorbic added to the white batter, before baking was 0.075%, and to the chocolate, 0.122%.

This inhibitor is permitted in concentrations to 0.3%.

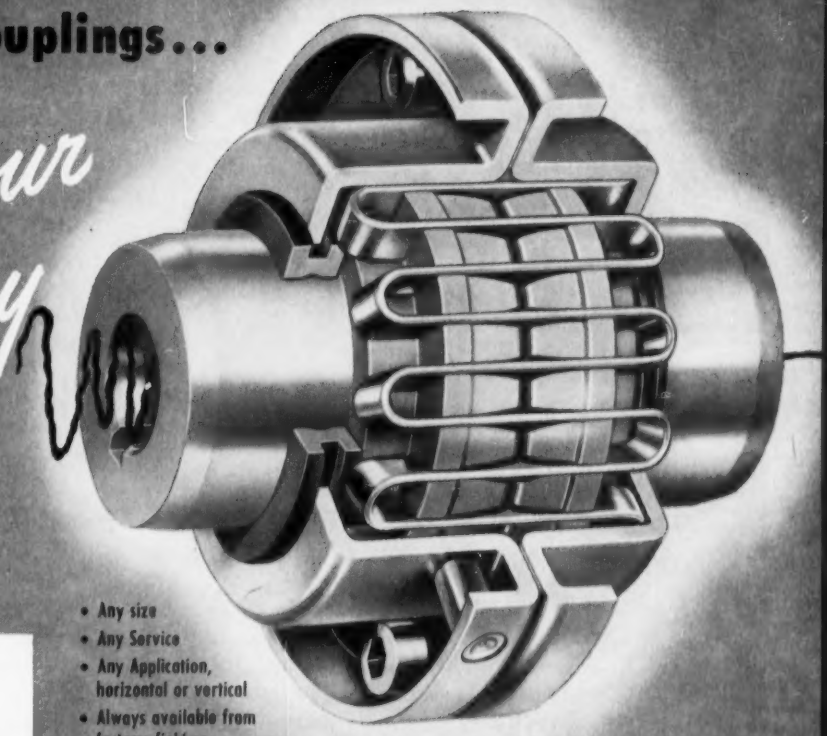


Multi-Method Rail Loading

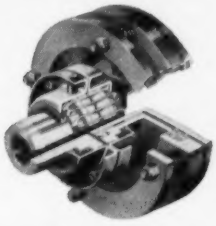
Four way loading of rail cars is flexible feature of A. E. Staley Mfg. Co.'s new starch drier building in Decatur, Ill. Hopper cars are filled from overhead enclosed conveyor (top). Bulk starch is also fed into box cars from an adjustable conveyor (Manierre). Bagged product can be palletized and trucked to cars, or delivered directly by conveyors.

Falk Steelflex Couplings...

Protect your machinery in 2 ways



- Any size
- Any Service
- Any Application, horizontal or vertical
- Always available from factory, field or distributor stocks

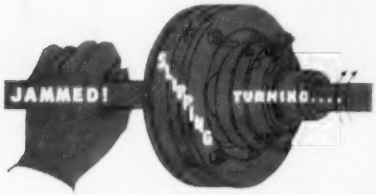


Falk Controlled Torque Couplings prevent damage from overloads

In applications where danger from overloads exists, use the FALK Type FT Controlled Torque Coupling. The Type FT has all the features and advantages of standard FALK Steelflex couplings—and, in addition, has an adjustable friction slip clutch, enabling the operator to set the coupling to slip at any predetermined overload.

This controlled-torque principle not only prevents transmission of dangerous shocks and limits overloads; it eliminates the breaking of shafts caused by jamming of driven equipment.

An outstanding advantage of the Type FT Coupling is that, as soon as the cause of the overload is removed, the entire coupling will rotate and transmit power without replacing parts or repairing coupling.



There's real economy in using Type FT Controlled Torque Couplings. Many users have reported that these couplings paid for themselves the very first time they slipped (under overload) because of the protection against damaged driving or driven machinery!

...cost less per year of service!

You get *double protection* when you connect your driving and driven machinery with a Falk Steelflex Coupling—the all-steel coupling with the exclusive grid-groove design! First, its *torsional resilience* smothers shock and vibration; and second, the Steelflex design prevents damage and lowered efficiency by accommodating shaft misalignment.

Why have increasing numbers of key men in industry standardized on Falk Steelflex Couplings? Their experience has proved that Falk Steelflex Couplings prolong the service life of their machinery... are trouble-free and need minimum maintenance . . . are easy to install, lubricate and disconnect . . . and *cost less per year of service* than ordinary couplings.

One basic Steelflex design—the type F, in its many sizes—is adaptable to more than 90% of all industrial applications. For applications involving danger from overloads, Modified Type FT Controlled Torque couplings (see column at left) are ideally suited. There are numerous other special or dual purpose Steelflex couplings for unusual applications. **Write to Department 247** for engineering bulletin, including selection and dimension tables.

THE FALK CORPORATION, MILWAUKEE, WISCONSIN

FALK

...a good name in industry

MANUFACTURERS OF:

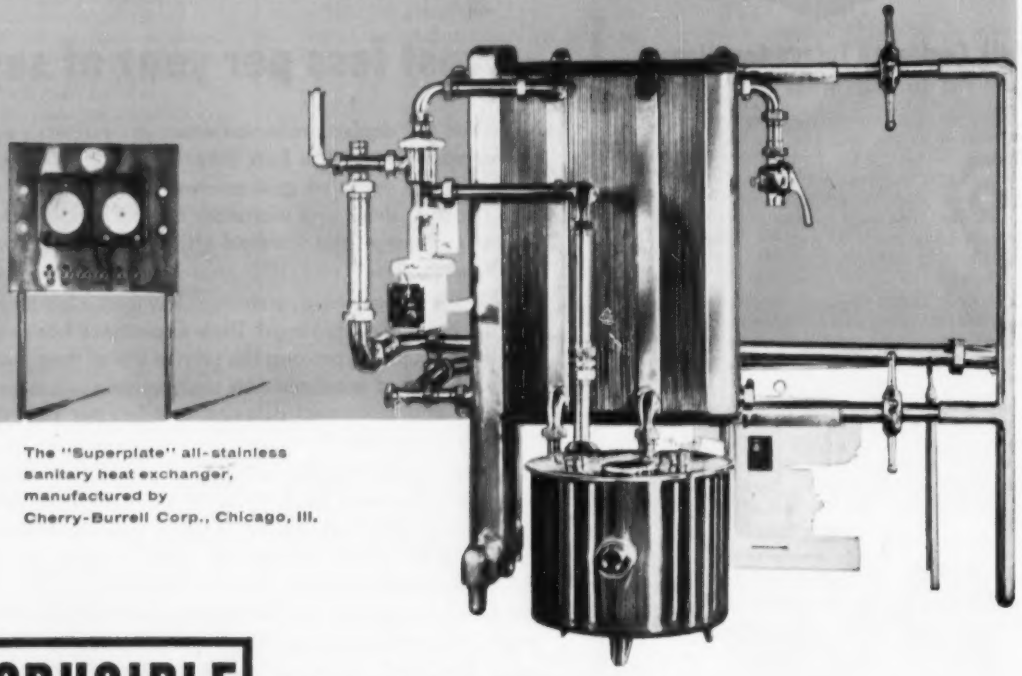
- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

why STAINLESS for this fluid-food heat exchanger?

Plate-type heat exchangers like this one, made practical by *stainless steel* construction, have become workhorses of the food processing industry. Liquids traveling through the unit at high velocity make *stainless* almost mandatory.

In fact, due to its inertness, corrosion resistance, easy cleaning and ability to stand high temperatures, *stainless* is being used more and more for all types of heat exchangers, evaporators, spray dryers, vacuum pans, and milk handling equipment.

It not only makes for more efficient processing, it actually cuts operating costs. For *stainless* equipment far outlasts other types, and it requires a minimum of costly maintenance. Next time you're buying equipment, be sure it's *stainless. Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*



The "Superplate" all-stainless sanitary heat exchanger, manufactured by Cherry-Burrell Corp., Chicago, Ill.

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

Canadian Distributor—Railway & Power Engineering Corp., Ltd.

Glass Container Use Rises

Shipments of glass containers (such as these) for use in packaging foods jumped 2% in 1956 to hit another all-time high, declares the Glass Container Mfrs. Institute. GCMI figures reveal that shipments in '56 topped 8.0-billion units, compared to 7.9-billion for '55. Food packaging, states the Institute, is the largest of the four end uses for glass containers and absorbs 43% of all shipments. Beverage bottles are the largest item in this category—using 5.1-billion containers in '56.

Schedule Short Courses

Four short courses covering instruments, quality control, and milk collection are scheduled at widely separated institutions during the month of March.

Food plant instrumentation will be covered at Foxboro Co., Foxboro, Mass., March 18-20. Basic knowledge on statistical quality control is under discussion at both U. of Illinois, Urbana (March 11-21), and Georgia Institute of Technology, Atlanta (March 12-20).

A training course in bulk milk tank collections will be presented at Pennsylvania State U., University Park, March 25-29.

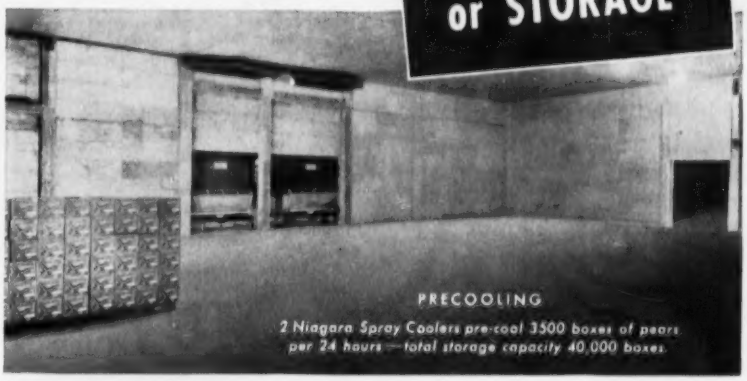
Fights Fat With Sugar

Mounting pressure on American consumers to watch their bulging waistline and eschew the capricious calory is now under counter-attack from the sugar people. The modus operandi: A publicity campaign extolling the virtues of the maligned product in a reducing diet.

Tagged the "Scientific Nibble," the plan put forth by Sugar Informa-

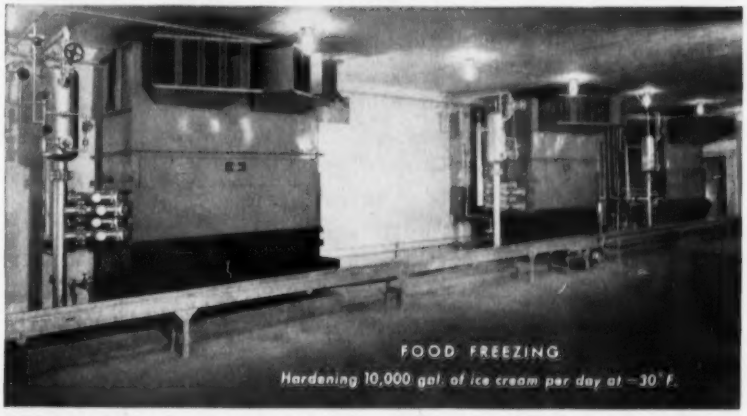
NIAGARA "No-Frost"

PRECOOLING or FREEZING or STORAGE



PRECOOLING

2 Niagara Spray Coolers pre-cool 3500 boxes of pears per 24 hours—total storage capacity 40,000 boxes.



FOOD FREEZING

Hardening 10,000 gal. of ice cream per day at −30° F.

FROZEN FOOD STORAGE

Room 80 ft. x 135 ft.—Temperature −5° F.

NIAGARA "No-Frost" gives you extra capacity and better operation. It improves quality, especially in foods, where it brings the product to correct temperature faster and holds it without fluctuation. It saves money for you in the cost of power and labor. With Niagara "No-Frost" there is never any "de-frosting" loss of time or temperature rise.

Write for Bulletin 105

NIAGARA BLOWER COMPANY

Dept. F.I., 405 Lexington Ave. New York 17, N. Y.

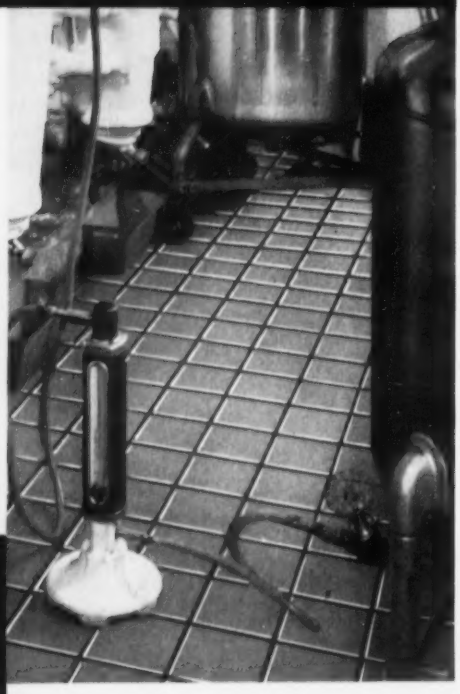
Sales Engineers in Principal Cities of U. S. and Canada

A quiet revolution in flooring... the ATLAS FURNANE®

food plant floors!

"Individually Engineered" for permanent protection and beauty

Strict sanitation requirements, harsh cleaning solutions, heavy equipment, and corrosive food ingredients make floor maintenance one of the largest single problems in the food processing industry. Atlas, aware of these needs, has developed a revolutionary new concept of permanent floor protection, "Individually Engineered" Furnane Floors.



This patented method of floor construction, based on sound engineering principles and the proper use of expansion joints, combines the tested techniques of installation with a brand new tile size—6" x 6" x 1⅜"—pioneered by Atlas. Furnane Floors previously were available using only 6" x 6" x ¾" and 4" x 8" x 1⅜" tile; now use of the new tile size incorporates additional advantages into this floor construction.

AN ATLAS FURNANE FLOOR OFFERS THESE ADVANTAGES:

the ability to withstand greater physical abuse and thermal shock while providing the complete corrosion protection required by different food processing operations and varying plant conditions. They also present the attractiveness and beauty of the traditional 6" x 6" pattern. Atlas "Individually Engineered" food plant floors are custom designed to meet your specific needs.

ATLAS MINERAL PRODUCTS COMPANY
MERTZTOWN, PENNSYLVANIA

Write today for the booklet, Food Floor Facts, giving complete information. Consult the Yellow Pages for your local representatives.

tion, Inc., New York City, calls for a little snack (containing sugar, of course) before each meal. The object: To raise blood sugar level and thus reduce appetite.

Corrections

In text of the Food Thermal Computer (FE Jan., p. 134)—Steps 6 and 7—substitute the letters M for N, N for O, and O for P.

In the item "Factors Influencing Losses During Lye Peeling of Sweet Potatoes" (Advances in Technology, FE Jan., p. 161), peeling losses are lowest for potatoes stored at 60F. (last line, second paragraph), not 50F.—*The Editors.*

World Food Shorts

Britain's largest canner, Batchelor Peas Ltd., is building an ultra-modern $7-million plant on a 23-acre site at Ashford. Annual production of 350,000,000 cans will be sped by some 100, electronic, pea and bean graders, and fast filling lines.

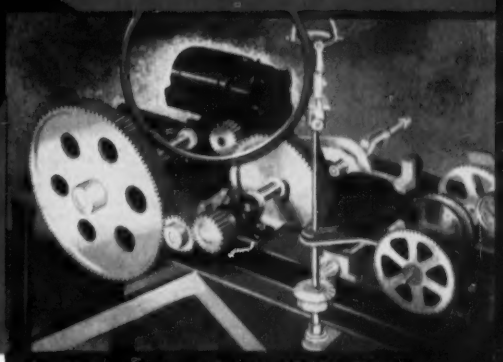
Synthetic Proteins are being investigated for medical and nutritional values at the Weizmann Institute of Science, Israel. Research on amino-acid polymers is sponsored by U. S. National Institute of Health.

Colombia may be first South American country to use the antibiotic chlortetracycline for extending the keeping quality of fresh meats. Preliminary experiments at Ibague indicate agent's suitability.

New Fruit-Candy Process treats bananas, mangos, jack fruit, and pa-

"This'll be sure-fire. And for a premium, we put in a little cereal."

Nothing Cuckoo about this clock!



The "works" of a tower clock. ⅓ H.P., 115/230 volt, 60 cycle, 1 phase Master Right Angle Gearmotor supplies main drive with a synchronous output speed of 30 R.P.M.

You may not need clock drives, but time (production time) is a problem everywhere—and that calls for the most dependable, most efficient use of electric drives—like here! This clock, with 300 lbs. of hands and four 24-foot dials is powered by a Master Gearmotor driving a precision gear train. With that accurate Master drive, here's a one-jewel clock!

Are you sure you've got the right answer to your drive requirements? Master components can be integrated in any combination to give you the right horsepower, right shaft speed, right mounting features, in a single, efficient, compact unit. Now's the time to let us prove it.

MASTER ELECTRIC MOTORS

ANOTHER DRIVE REQUIREMENT MEETS ITS MASTER

Motor Ratings	⅛ to 400 H.P. All phases, voltages, frequencies.
Motor Types	Squirrel cage, slip ring, synchronous, repulsion-start induction, capacitor, direct current.
Construction	Open, enclosed, splash-proof, fan-cooled, explosion-proof, special purpose.
Speeds	Single-speed, multi-speed, and variable speed.
Installation	Horizontal and vertical, with or without flanges and other features.
Power Drive Features	Electric brakes (2 types)—5 types of gear reduction up to 432 to 1 ratio. Mechanical and electronic variable speed units—fluid drives—every type of mounting.

THE MASTER ELECTRIC COMPANY

Dayton 1, Ohio

One look at the huge, sprawling buildings at one of the Exchange Products plants and you know that big things are happening inside. For here *citrus* is king. Trucks pour in with fresh fruit from groves all over California and Arizona. Conveyer belts hum along in every direction. And Exchange products are shipped to nearly every part of the world.

Why 'Exchange' products serve you better

Utmost cleanliness is the watchword at Exchange Products plants. Everything has that "just washed-down" look. Every four hours, extraction equipment is completely cleaned. Every third day, the entire plant closes down for a thorough washing.

Exchange quality is assured by constant checking in extensive testing laboratories. In fact, rigid quality controls have been set up *throughout* the plant to make sure that every product measures up to Exchange quality. Sunkist produces more than 400 different citrus products.

The world's largest citrus research department is maintained by the Sunkist Growers to develop new growing methods, to improve manufacturing processes, and to perfect better products. Today, with a backlog of more than 60 years experience, Sunkist has accounted for 118 separate U.S. patents.

Just three of many Exchange products are *Exchange Preserver's Pectin*—guarantees a more uniform finished product; *Exchange Low Methoxyl Pectin*—jells *without* sugar, tasteless, controls "weeping" in pies; *Exchange Lemon Juice*—brings out natural flavor of *any* food. Superior acidulant, excellent anti-oxidant.

Sunkist Growers

PRODUCTS DEPARTMENT • ONTARIO, CALIFORNIA

Distributors for

Exchange Lemon Products Co., Corona, Calif. • Exchange Orange Products Co., Ontario, Calif.

paya with potassium meta-bisulfate. Resulting pulp is concentrated, then sugar, milk powder, and fat are added. Method was developed by Central Food Technological Research Institute, Mysore, India—*McGraw-Hill World News.*

BRIEFLY

• **TRANSPORTATION takes 8c. out of every consumer food dollar, states USDA. This is a 2c. jump since '45. Fresh produce takes the biggest wedge, even though processed foods actually cost more to ship.**

• COCOA BEAN grindings totalled 437,805,963 lb. for 1956—a 15.7% hike over '55, according to the Assn. of Cocoa & Chocolate Mfrs.

• **MARGARINE manufacturers have moved fast to accept the recently standardized 1-lb. Eastern flat carton. Over 70 processors and distributors are now packaging their product in the container, asserts the National Assn. of Margarine Mfrs.**

• FOOD TECHNOLOGISTS in Wisconsin are getting an IFT charter. Contact P. Buck, U. of Wisconsin, Madison, for particulars on meetings.

• **TIME CLOCKS are rapidly being discarded in progressive companies, reports Chemical Week, a McGraw-Hill publication. The elimination raises worker morale, but puts an extra burden on foremen, who must assume the time-keeping duties.**

• POULTRY is now sold almost entirely in ready-to-cook form, declares USDA. Of the 4.3-billion lb. of birds slaughtered in '56, 88% were ready for the stove.

• **FROZEN DESERTS rank as major users of fruits and nuts, says the AMS. A recent survey shows that about 112,000,000 lb. of fruits and nuts in all forms went into these products in 1953.**

Action on Standards

Following actions have been taken by the Agricultural Marketing Service (AMS) and Food & Drug Administration (FDA) on U. S. Standards and allowable tolerances of various pesticides on raw agricultural commodities. References are to *Federal Register.*

Apricots, AMS establishment of U.S. Standards, *F.R.,* Dec. 13, p. 9935.

Lima beans, frozen, extension of time on proposed U.S. Standards, *F.R.,* Jan. 5, p. 146.

Rice, enriched, establishment of

LA PORTE

moves food up · down · horizontally

You can handle every food conveying operation, from loading hopper to shipping dock, with this versatile, sanitary belt that is quickly and easily converted for flight conveying by attaching the La Porte cleat.

The steel mesh feature allows circulation of air and liquids around products in process; also facilitates cleaning and sterilizing with steam gun or hot water. La Porte belting will not weave, creep nor jump. Its rugged construction assures long, economical service and low maintenance costs.

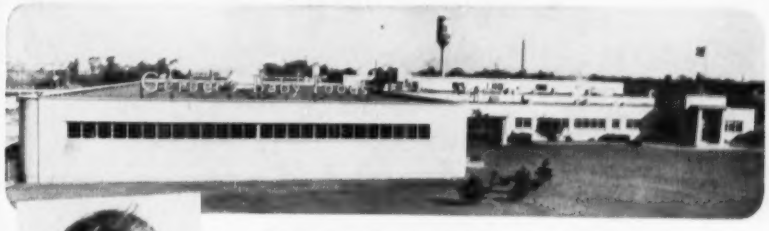
Available in any length and practically any width.

LA PORTE

Write TODAY for illustrated literature, prices.

MAT AND MFG. CO.

BOX 124 *La Porte, Indiana*



GERBER'S BABY FOODS

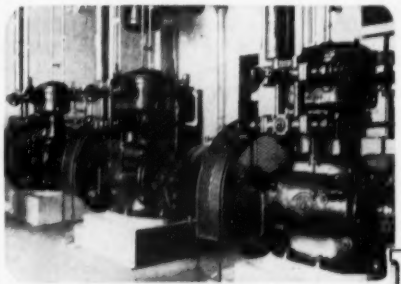
Made at Rochester with

Frick Refrigeration

These famous foods, described in the October Reader's Digest, are revolutionizing the feeding of youngsters.

We are proud to have furnished the cooling system for Gerber's new plant, where 500,000 jars of strained foods are packed daily. Installation (full-automatic) by Mollenberg-Betz Machine Co., Frick Distributors at Buffalo.

Specify Frick refrigeration, air conditioning, ice making or quick freezing for that important cooling system of yours. Literature and estimates on request: write today to



Three of Six Frick Ammonia Compressors at Gerber's.

DEPENDABLE REFRIGERATION SINCE 1882

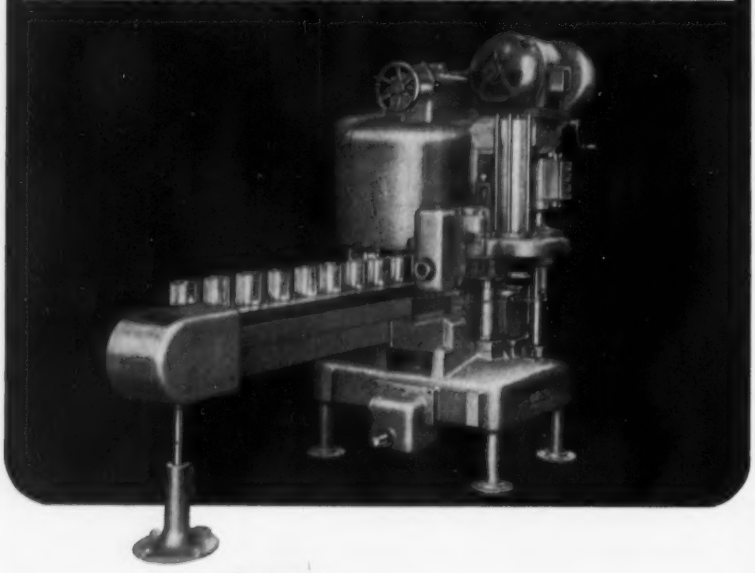
FRICK CO.

WAYNESBORO, PENNA., U.S.A.

For more data, circle this page number on card at back →

Swing To...

ANGELUS
CAN CLOSING MACHINES



Welcome to Angelus Booth No. 5
Annual Canning Machinery & Suppliers Association Convention
Chicago—Feb. 16-20, 1957

Through demonstration and personal inspection you can make your own appraisal of what Angelus means by dependability of operation, economy and simplicity of maintenance, and low investment costs that have canners and can makers the world over swinging to Angelus Can Closing Machines.

ANGELUS
Sanitary Can Machine Company
Cable Address "Angelmaco" Western Union Code
4900 Pacific Boulevard • Los Angeles 58, Calif.

Standards of Identity, *F.R.*, Dec. 28, p. 10412.

On beet tops, chinese cabbage, collards, endive, kale, lettuce, mustard greens, romaine, spinach, and swiss chard, proposed tolerances for Zineb, *F. R.*, Dec. 4, p. 9582.

Orange juice, notice of time extension for filing views and comments on proposed Standard of Identity, *F. R.*, Dec. 7, p. 9726.

On grapes, proposed tolerance of 3-(3, 4-dichlorophenyl)-1, 1-dimethylurea, *F.R.*, Dec. 15, p. 9991.

On shelled corn, grain sorghum, tolerances of mineral oil, *F.R.*, Dec. 21, p. 10274.

On beans, bitter melon, cavendish bananas, citrus fruits, cucumbers, guavas, mangoes, papayas, peppers, pineapples, and zucchini squash, tolerances of ethylene dibromide, *F.R.*, Jan. 3, p. 87.

On grape-fruit, lemons, and oranges, tolerances of diphenyl, *F.R.*, Jan. 3, p. 87.

On apricots, tolerances of Maneb, *F.R.*, Jan. 3, p. 88.

On sugar beets, tolerances of sodium 2, 2-dichloropropionic acid, *F.R.*, Jan. 3, p. 32.

Schedule of Events

February

15-16—National Preservers Assn., annual convention; Morrison Hotel, Chicago.

15-17—Institute of American Poultry Industries, annual conference; Municipal Auditorium, Kansas City, Mo.

16-20—National Canners Assn., Canning Machinery and Suppliers Assn., overall convention and exposition; Conrad Hilton Hotel, Chicago.

23-28—U. S. Brewers Foundation, annual convention; Fairmont and Mark Hopkins Hotels, San Francisco.

26-27—National Dairy Engineering Conference; Kellogg Center, Michigan State U., E. Lansing.

25-M1—American Society of Heating & Air-Conditioning Engineers, annual convention and exposition; International Amphitheatre, Chicago.

March

4- 7—American Society of Bakery Engineers, annual meeting; Edgewater Beach Hotel, Chicago.

10-22—American Institute of Baking, sales management seminar; Chicago.

13-17—Grain Processing Machinery Mfrs. Assn., annual meeting; Edgewater Gulf Hotel, Edgewater Park, Miss.

14-15—Dairy Industries Supply Assn., annual meeting; Shoreham Hotel, Washington, D. C.

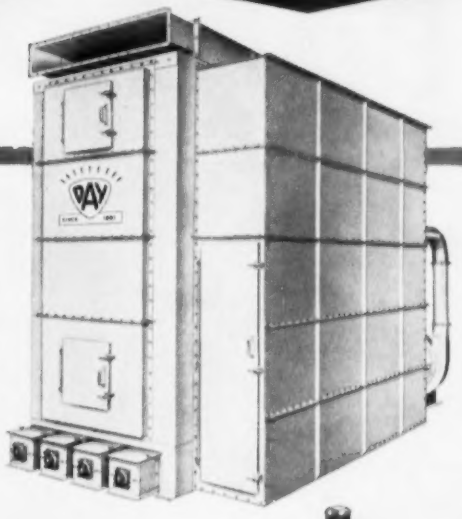
14-16—Pacific Dairy & Poultry Assn., annual meeting; Hotel Ambassador, Los Angeles.

18-21—Society of Plastics Industry, annual conference & exposition; Hotel Biltmore and Shrine Exposition Hall, Los Angeles.

← For more data, circle this page number on card at back

DUST CONTROL | **BULK STORAGE** | **PNEUMATIC CONVEYING**

DAY PRODUCTS
SERVE THE FOOD INDUSTRY



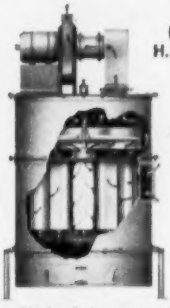
...CONTROLLING DUST

DAY "AC" Reverse-Jet DUST FILTER ● Dollar for dollar, feature for feature, you get more for your money with a DAY "AC" filter. Economical first cost and low maintenance PLUS the fact sub-assembly by DAY saves up to 75% on installation costs. ● Felted filtering media captures sub-micron dust particles with 99.99+% efficiency. Media porosity is maintained by self-adjusting, high pressure, reverse-jet blow rings. ● DAY filters occupy less floor space—need less headroom—are furnished to operate on suction or pressure. ● May be installed inside or outside; outside units completely weatherproof. **Write for Bulletin 559 for complete facts and engineering data.**

DUAL-CLONE DUST SEPARATOR

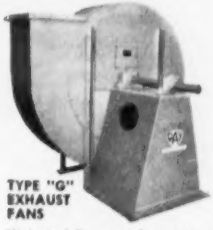
Exclusive DAY design provides high efficiency with low horsepower requirements. **Write for Bulletin 49DC.**

(Licensed by H. J. Hersey, Jr.)



TYPE "RJ" DUST FILTER

Surge of high velocity reverse air maintains filter media porosity of this "packaged" dust filter. 99.99+% efficiency. **Write for Bulletin 560.**



TYPE "G" EXHAUST FANS

High air delivery per horsepower required. Statically and dynamically balanced; designed exclusively for dust control applications. **Write for Bulletin 471.**

DAY UNIT DUST CONTROLLERS

Complete, low cost unit combines high efficiency of DAY Dual-Clone and Exhauster. Ideal for remote locations. **Write for Bulletin 510.**

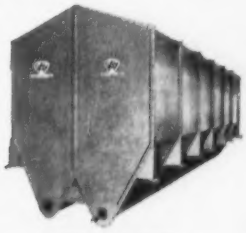
A SINGLE UNIT OR A COMPLETE DUST CONTROL SYSTEM

DAY Vertical Type Bulk Storage Bins

...HANDLING AND STORING BULK MATERIALS

Vertical or horizontal bins, special sizes or groups furnished to meet production needs; air lock rotary valves, twin screw feeders and other auxiliary equipment optional. DAY bins need no field riveting, soldering or welding. Built and shipped in easily erected bolted sections. **Write for Bulletins 529 and 549.**

AIR LOCK ROTARY VALVE



HORIZONTAL TYPE BULK MATERIAL BIN

INDIVIDUAL BULK EQUIPMENT UNITS OR A COMPLETE BULK MATERIAL SYSTEM

...PNEUMATIC CONVEYING

DAY Pneumatic Conveyor equipment and systems provide a modern method of bulk material handling. Self-cleaning to prevent contamination or product deposits in system. Speed of operation improves plant efficiency. Write for details.

75 YEARS — SERVING INDUSTRY SINCE 1881

The DAY Company

817 Third Ave., N.E., Minneapolis 13, Minn.
P. O. Box 70D, Ft. William, Ontario

Branch Plants: Buffalo, Ft. Worth, Toronto
Representatives in Principal Cities

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CENTURY HAS THE COMPLETE LINE...

Big as 400 H.P.

125 H.P. Type SC

small as 1/20 H.P.

WHATEVER YOUR APPLICATION THERE'S A Century MOTOR

Performance-Rated© to do the job

You'll get the top performance your equipment's designed for . . . because there's a motor *designed for it* in the Performance-Rated Century line.

Century's technique of Performance-Rating enables you to choose motors with the right size, speed, frame, and torque characteristics to fit—*exactly*—your application requirements.

You can select from a range of 400 to 1/20 h.p.; AC single or polyphase, or DC; drip proof, dust proof, or explosion proof frames. There are optional corrosion-resistant features; constant speed, multi-speed, varying or geared speeds.

Let us prove the value of Performance-Rating for you . . . without obligation. Call or write your nearby Century District Sales Office or Authorized Distributor.

Performance-Rated© MOTORS 1/20 to 400 H.P.

CENTURY ELECTRIC COMPANY

1806 Pine Street • St. Louis 3, Missouri • *Offices and Stock Points in Principal Cities*

Objective Frozen Food Tests

—*Continued from page 125*

Additional new findings were revealed by members of the WURB technical panel. Helen Hanson reported these facts:

Turkey pie became rancid in 1½ to 2 months at 20 deg. Creamed turkey maintained its quality longer because the sauce excludes air. But an antioxidant is indicated for that product.

Fried chicken became rancid in 6 months at zero. But its quality life was doubled by eliminating oxygen with nitrogen in hermetically sealed cans.

If the thickening agent in sauces, gravies, custards, and puddings is waxy rice flour, the products will be smooth after a year at zero. With this thickener, any curdle disappears on heating.

Fruit Suspect at 15 deg.

Significant facts about frozen fruits were presented by E. F. Jansen:

Fluctuating temperatures have the same effect as their steady average, and the order in which different temperatures occur has no significance. Effects of different temperature-time conditions are cumulative.

Fruits start rapid quality deterioration at 15 deg., and any fruit above that temperature should be suspect. Hermetically sealed containers help protect quality at temperatures much above zero, but they offer no advantage at zero.

Temperature inside a corner package in a case is the same as that between the package in the corner and the one next to it. So product temperature can be measured by inserting a dial thermometer stem between the two packages.

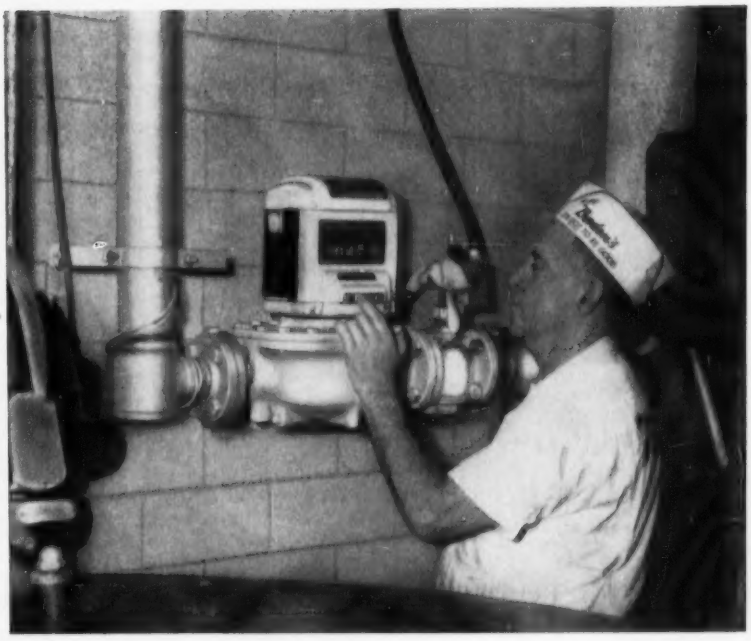
Color Key for Vegetables

These results of research on vegetables were discussed by W. F. Talburt:

The first detectable change in frozen peas is in color. A 50% loss in chlorophyll is the point at which consumers complain.

Steam and water blanches have about equal effect on chlorophyll. Short-high blanching is best—5 min. at 190 deg. results in 70% chlorophyll retention, while 85% is retained with a 2-min. blanch at 205 deg., and 95% at a still higher temperature.

End (*Resume reading on page 127*)



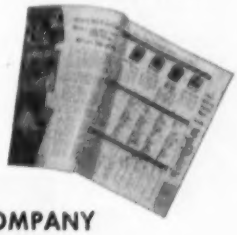
For better taste control
Borden uses

NEPTUNE *liquid* METERS

Borden's ice cream earns repeat sales because its good flavor never wavers from batch to batch. By measuring exactly the right amount of corn syrup into the mix, Neptune meters help insure uniform, well-flavored ice cream.

Borden's saves handling heavy bags of corn syrup solids, too, and improves plant housekeeping as well as employee morale . . . extra bonus values from their Neptune meters. The operator simply pushes the buttons to set the quantity required . . . opens valve . . . and the meter shuts off at the predetermined quantity.

Hundreds of plants now depend on Neptune meters to handle over 150 liquids — hot or cold water, soap solutions, oils, syrups, brines, many chemicals, etc. Sizes: ⅝ to 6 in. Capacities: 2 to 1000 gpm. Automatic ticket printing also available.



Neptune meters can benefit your operation wherever liquids flow. Send for free, helpful Metering Bulletin 567-CF .

neptune liquid METERS

NEPTUNE METER COMPANY
19 West 50th Street, New York 20, N. Y.

Branches in: ATLANTA • BOSTON • CHICAGO • DALLAS • DENVER • LOS ANGELES • LOUISVILLE • No. KANSAS CITY, Mo. • PHILADELPHIA • PORTLAND, ORE. • SAN FRANCISCO (Millbrae) • IN CANADA: TORONTO 14, ONT.

For more data, circle this page number on card at back →

Stainless Steel Cuts Cleaning Time and Costs

Republic ENDURO Stainless Steel shelves and conveyor belt help keep sanitary the sorting and packing of haddock fillets. Equipment fabricator is the J. D. Farasey Mfg. Company, Cleveland, Ohio. Stainless saws are made by the Biro Manufacturing Company, Marblehead, Ohio.

Blue Water Seafoods, of Cleveland, Ohio, speeds processing of frozen fish—cuts clean-up time and costs to a minimum with a battery of stainless steel saws and a stainless conveyor line.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

← For more data, circle this page number on card at back

Here are the facts

Frozen haddock, in blocks 10″ x 20″ x 2½″, are shipped direct to Cleveland from the Newfoundland Banks. The blocks are then cut into fillets for individual servings, by saws fabricated from Republic ENDURO® Stainless Steel. They then pass along a conveyor, also made from ENDURO, where they are breaded. Finally, the fillets are packaged for delivery to restaurants and institutions.

Easy to Clean

Like so many other food processors, Blue Water Seafoods has found that ENDURO-made equipment speeds the entire operation. Downtime between processing operations is held to a minimum because ENDURO is so easy to clean and keep clean—a feature so important to plants under continuous U.S.D.A. inspection. The need for costly scrubbing compounds is eliminated. Usually a simple washing with soap and water rids the equipment of all residue and readies it for the next operation.

No Metallic Contamination

There's never any danger of metallic contamination with ENDURO-made equipment. It never adds unwanted flavor. Never takes anything away. ENDURO'S smooth, hard, dense surface offers little foothold for contaminants or bacteria. Corrosion caused by food acids and moisture is locked out.

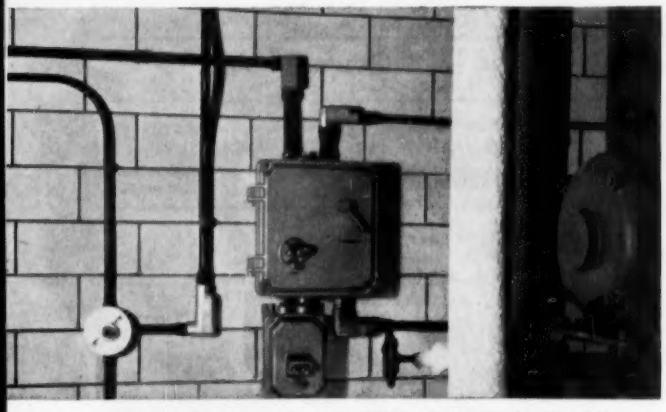
Never Needs Refinishing

Because ENDURO is solid stainless steel all the way through, there is no applied surface to crack, chip, flake or peel away. Subject it to blistering heat or sub-zero cold and it still maintains its strength, toughness and corrosion-resistance.

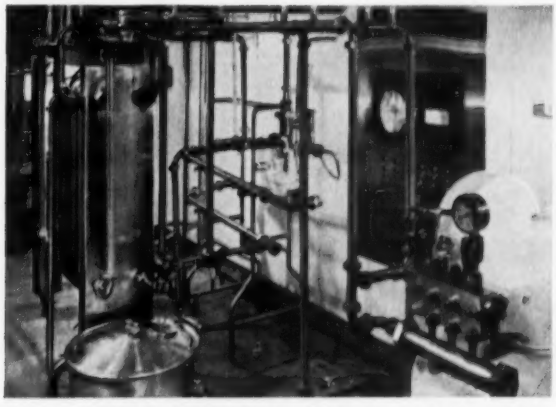
Long, Trouble-free Service

ENDURO Stainless Steel in any food processing operation means long-range economies and trouble-free service. It will take persistent abuse and still maintain its sanitary appearance.

Safeguard the quality and purity of your product, and cut costs, by using equipment made from Republic ENDURO Stainless Steel. Your equipment-supplier has all the facts. Or send us the coupon for more information.



CUT MAINTENANCE COSTS OF ELECTRICAL RACEWAYS. In this cold-storage plant, Republic Dekoron®-Coated Electrical Metallic Tubing resists the corrosive action of vapors and moisture caused by extreme temperature variations. A polyethylene coating over a galvanized finish provides double protection. Moisture-tight, corrosion-protected joints are made by wrapping the threadless connectors and couplings with plastic tape. Dekoron®-Coated E.M.T. and rigid steel conduit cost less because they last longer. Mail the coupon for more facts.



ELIMINATE CONTAMINATION AND DISCOLORATION by conveying food, dairy and beverage products through Republic ELECTRUNITE® Stainless Steel Tubing and Pipe. Fabricated from Republic ENDURO Stainless Steel, they offer the highest resistance to corrosion. ENDURO'S great strength, resistance to temperature, pressure and physical damage make Republic Stainless Steel Tubing and Pipe ideal for processes requiring fluid materials-handling at high temperatures and pressures. They will last indefinitely. Mail coupon for more data.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
Dept. C-2840
3160 East 45th Street, Cleveland 27, Ohio

☐ Please send more information on ENDURO Stainless Steel for food processing.

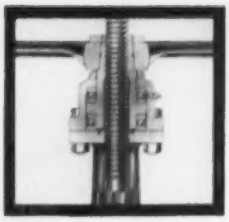
I am also interested in more data on:
☐ Dekoron-Coated E.M.T.
☐ ENDURO Stainless Steel Tubing & Pipe

Name_____ Title_____

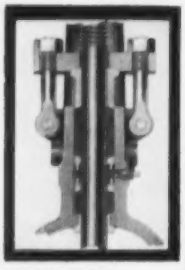
Company_____

Address_____

City_____ Zone____ State_____

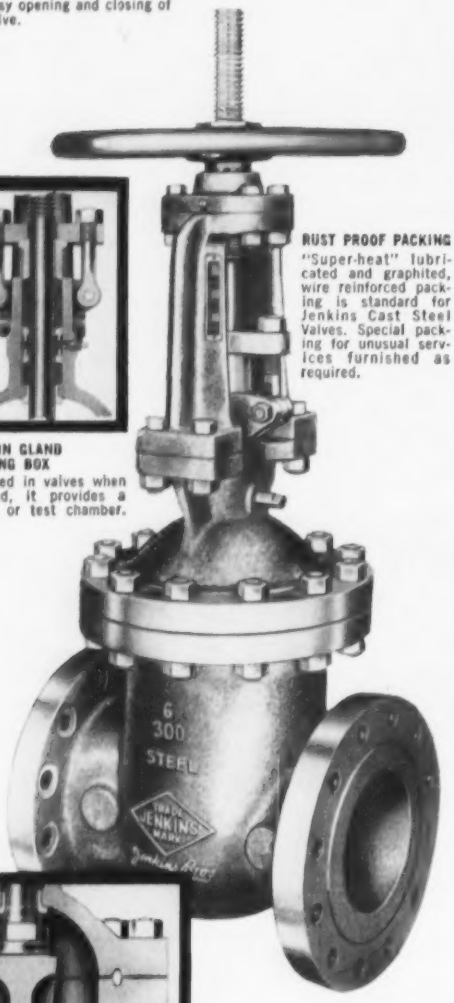


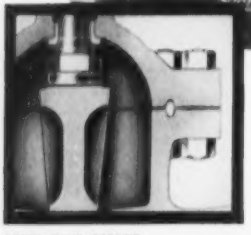
BALL BEARING YOKE SLEEVE
Standard on larger sizes of all 300, 400, and 600 psi Cast Steel Valves, it permits easy opening and closing of valve.



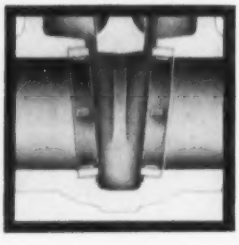
LANTERN GLAND STUFFING BOX
Furnished in valves when specified, it provides a cooling or test chamber.

RUST PROOF PACKING
"Super-heat" lubricated and graphited, wire reinforced packing is standard for Jenkins Cast Steel Valves. Special packing for unusual services furnished as required.





STEEL RING GASKET
All 400 and 600 psi Valves are furnished with soft steel ring joint body-bonnet gasket, fitted into accurately matched grooves, assuring a lasting, vapor-tight joint.



THROUGH PORT GATE DESIGN
Wedge lifts out of flow when valve is full open, permits free, unobstructed flow.

for design features that deliver
top-rated efficiency . . . lasting economy

JENKINS CAST STEEL VALVES

The details shown are only a few of the many design features developed by Jenkins valve specialists to make Jenkins Cast Steel Valves a match for the most punishing requirements of higher pressure, higher temperature services.

You can get the required combination of casting alloys and seating metals for services up to 600 psi — 1000°F. With any valve specified, you get the *plus* of Jenkins *extra value*, — in performance, in lasting economy.

Compare every feature, and you'll see why Jenkins Cast Steel Valves are first choice for so many systems planned for lowest operating cost.

PATTERNS	Gates 2" to 24" — Globes 2" to 10" — Angles 2" to 10" — Swing Checks 2" to 12". Non-return, stop and check Globes and Angles, 4" to 10" Screwed, Flanged, or Weld Ends
PRESSURES	150 lb. — 300 lb. — 400 lb. — 600 lb.
PRESSURE CASTING ALLOYS	Carbon Steel — 150 lb. Valves Carbon Molybdenum Steel — 300, 400, 600 lb. Valves Chromium Molybdenum Steel (when ordered)
SEATING METALS (in various combinations)	H Monel 13% Chromium Stainless Steel Carbon Molybdenum Steel, Stellite faced AISI Type 316 Stainless Steel

GET THE JENKINS CAST STEEL VALVE CATALOG

It describes all patterns, casting alloys, and seating combinations, with details of the *extra value* design and construction features. Gives pressure-temperature ratings, dimensions, and other technical data. Get a copy from your Jenkins Valve Distributor, or write: Jenkins Bros., 100 Park Ave., New York 17.

JENKINS VALVES

LOOK FOR THE JENKINS DIAMOND

SINCE 1864 TRADE JENKINS MARK

Jenkins Bros

SOLD THROUGH PLUMBING-HEATING AND INDUSTRIAL DISTRIBUTORS

MEN & COMPANIES

Glen Sober—*Forerunner With Frozens*

Smiling Glen Sorber, retired pioneer, receives illuminated scroll from San Francisco Section, American Society of Refrigerating Engineers. The parchment honors his 35 yr. of scientific contributions to the refrigeration and food technology fields, and it bears more than three score signatures of fellow engineers.

Initially associated with early frozen food research in Seattle, Mr. Sorber became a USDA researcher in Los Angeles, then continued with Western Regional Research Laboratory, Albany, Calif. In recent years he worked directly with most western plants in developing key frozen-food research programs. He was closely associated for a number of years with H. C. "Dutch" Diehl, who now directs the Refrigeration Research Foundation.

Personnel

Paul Armstrong, general manager of Sunkist Growers (formerly California Fruit Growers Exchange) will retire after 41 years of service with the organization.

Arthur A. Acklin, board member and chairman of the advisory committee of Coca-Cola Co., has retired after 31 yr. with company.

Harvey J. Bolser is newly appointed director of advertising and merchandising for Anheuser-Busch, Inc., St. Louis.

Earl A. Clasen has been elected v.-p. of Pillsbury Mills, Inc.

John F. Carolan is new manager of Meadow Gold Foods' Carson St. plant, Pittsburgh.

Elmer J. Grimmett has been named v.-p. for manufacturing and engineering, General Foods Corp., White Plains, N. Y.

E. T. MacHardy, Refined Syrups & Sugars, Inc., Yonkers, N. Y., has been named to the Sugar Research & Marketing Advisory Committee of USDA.

W. F. McMahon has been elected general sales manager of Thomas J. Lipton, Inc., Hoboken, N. J.

Jack R. (Jackie) Robinson, Brooklyn baseball star and first Negro player in the majors, has retired from the diamond to join Chock Full O' Nuts Corp. He becomes v.-p. in charge of personnel in the company's 27 metropolitan restaurants, Brooklyn coffee plant, and Harrison, N. J., bakery.

Dr. Harry A. Ross has retired as v.-p. and director of Borden Co. and as president of the Borden Co. Foundation.

Edwin B. Schmink is new president of Borden Co.'s Michigan Milk Div.

Carl Schmitz, Vance E. Vorhees, B. H. Stenberg, and E. H. Stubenrauch have been named, respectively, executive v.-p., v.-p. in charge of sales, v.-p. in charge of manufacturing, and assistant general sales manager for Crane Packing Co., Morton Grove, Ill.

Staley's H.V.P.* works 4 ways to improve your food products

*HYDROLYZED VEGETABLE PROTEIN

From soups to hash, baked beans to sausages—whatever your product—you'll enjoy greater repeat sales when you add Staley's H.V.P. to your recipes. And here's why:

(1) Staley's *new* H.V.P. *adds* natural meat-like flavor. (2) It enhances taste appeal in a wide variety of foods. (3) It gives you greater flavor solids concentration. (4) It assures a uniform, better balanced flavor of your products.

Staley's H.V.P. is made by an exclusive, new process to give you liquid Hydrolyzed Vegetable Protein with improved flavor, a rich, golden-brown color—at lower cost.

For complete technical application data, write:

A. E. STALEY MFG. CO., Decatur, Illinois

For more data, circle this page number on card at back →

H. B. Nicholson, Coca-Cola Co. board chairman, has been re-elected director of the National Industrial Conference Board in New York.

Industry

Borden Co., N.Y.C., announces it expects to spend $150,000,000 in expansion and modernization of its facilities over 1957-'61 period.

Campbell Soup Co. has purchased a 385 acre site at Portage-la-Prairie, Canada, for erection of a $5 million food processing plant.

Miami Margarine Co., Cincinnati, and **Durkee Famous Foods, Div. of Glidden Co.,** jointly announce the sale to former of latter's margarine and salad products operations in Norwalk, Ohio, and Chicago.

Morningstar, Nicol, Inc., Hawthorn, N. J., has laid the cornerstone for its new plant, which is designed to double floor space and triple production in its Hawthorn natural gum and starch processing operation.

National Sea Products Ltd., Halifax, Nova Scotia, reports it has purchased the Birds Eye frozen foods operations at Rockland, Me.

Sunshine Biscuits, Inc., has bought Schuler Potato Chip Co., Rochester, N. Y., the latter has announced.

Theo. Hamm Brewing Co. has started construction on a new $1 million warehouse adjacent to its San Francisco plant.

Associated Industries

Alpha Plastics, Inc., Livingston, N. J., has named Thomas F. Long v.-p. in charge of sales.

Alvey Conveyor Mfg. Co., St. Louis, has named Peter Horn v.-p. in charge of engineering; John M. Alvey, Jr., assistant to the president; and Walter G. Brand chief engineer.

American Can Co. has elected F. B. Newcomb v.-p. in charge of the central division.

Arcos Corp., Philadelphia, has appointed Royal D. Thomas board chairman, and R. David Thomas, Jr., president.

Atlanta Paper Co., Atlanta, has appointed E. R. Brooks v.-p. for production.

Babcock & Wilcox Co., N.Y.C., has elected S. T. Machenzie v.-p.

Blaw-Knox Co., Pittsburgh, has named J. E. McWilliams and Howard M. Winterson as v.-p.'s.

Sterling Doughty, president and general manager of Sacramento Freezers Inc., Sacramento, Calif., is new president of National Assn. of Frozen Food Packers.

Borg-Warner Corp., York, Pa., has promoted Henry M. Haase to post of president and chief executive officer of its York Div.

Canning Machinery & Supplies Assn., Washington, D. C.,

Another Engineering Achievement in Packaging Automation

Now . . . YOU CAN PACK YOUR PRODUCT *Automatically!*

QUADNUMATIC

4 MACHINES IN 1

1. CASE OPENER 2. ACCUMULATOR 3. PACKER 4. SEALER

The QUADNUMATIC was designed to fill a long felt need for a single unit to open and form cases, automatically accumulate the case load, inject it into the case, glue and seal.

This all steel pneumatically driven machine is a modern custom engineered unit only 16 feet long.

QUADNUMATIC accumulates any desired pattern in any number of tiers and opens and loads top opening or end opening cases.

Some items now being packed by the Quadnumatic . . .

- CANNED MILK
- POWDERED MILK
- HOUSEHOLD FOIL
- HOUSEHOLD WAX PAPER
- PACKAGED PAPER
- CANS OF PAINT
- PACKAGED SUGAR
- SPARK PLUGS
- OIL FILTERS
- TOILET TISSUE
- FLASHLIGHT BATTERIES
- FROZEN FOOD PKGS.
- FLASH BULBS
- LIGHT BULBS
- COILED WIRE
- LARD

Other Engineering Achievements

THE 9 FT. CASEALER . . . CASE OPENERS . . . CASE OPENERS AND BOTTOM GLUERS

SCHROEDER MACHINES CORPORATION

NEW COURT AVE., INDUSTRIAL PARK, EAST SYRACUSE, N. Y. BOX 1123, SYRACUSE, N. Y. PHONE 73-6658

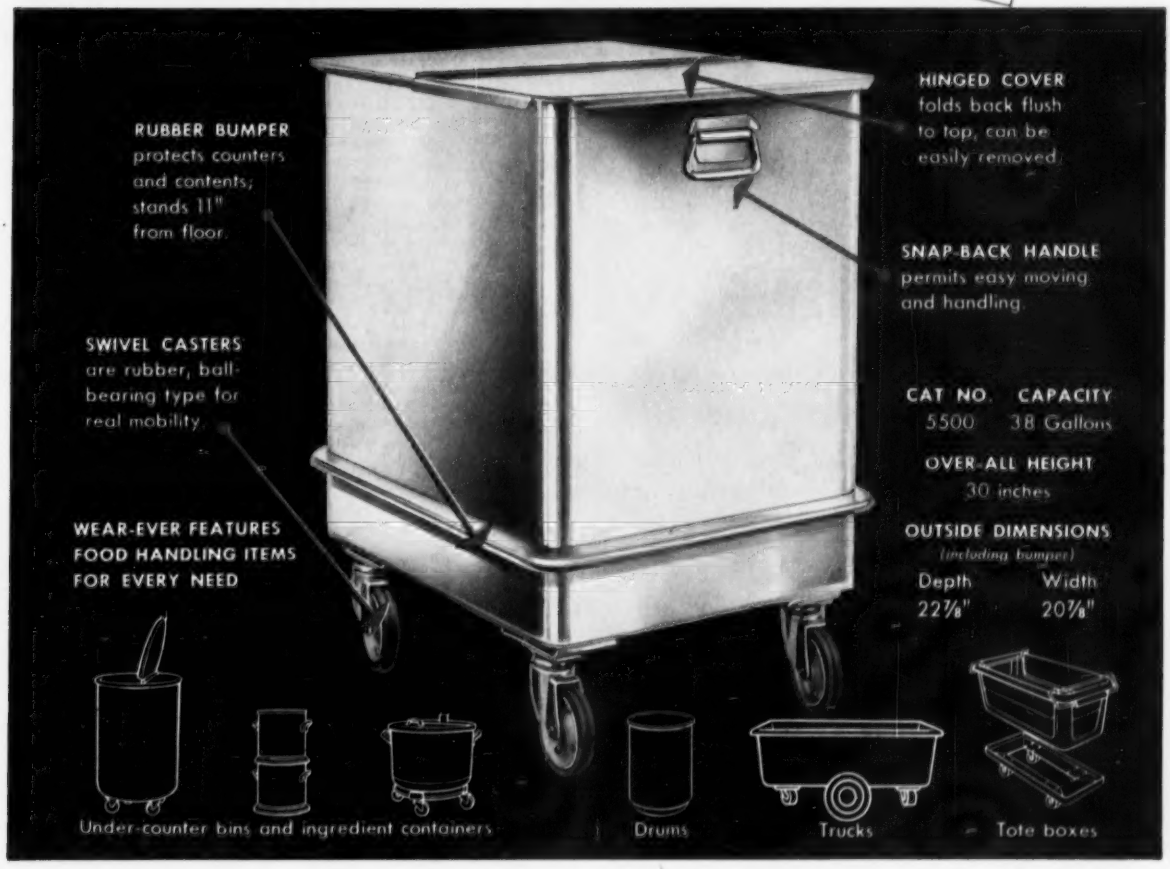
... now ... 33-1/3% more capacity ...

in this new rectangular, mobile under-counter type

BIN

by WEAR·EVER

WEAR-EVER ALUMINUM TRADE MARK REG. U.S. PAT. OFF.



We've "squared away" the conventional round container, to give you ⅓ *more* carrying and storing capacity, *in comparable over-all size.* Think what this can mean to you in faster handling, fewer refills, greater utility.

Quality's the same, of course, as in all Wear-Ever Aluminum food handling items. Extra hard-wrought dent and scratch resistant alloy. Seamless construction. Smoothly rounded, easy-to-clean inside corners. Sanitary flared rim.

Naturally, we've designed this new container for a perfect fit under your standard cook's and baker's work tables —same as the round type.

Like to see a sample? Pick up the phone and ask your Wear-Ever man to wheel one over. Or send coupon for full details on our complete food handling line.

WEAR·EVER ALUMINUM UTENSILS

THE ALUMINUM COOKING UTENSIL COMPANY, INC.
WEAR-EVER BLDG., NEW KENSINGTON, PENNSYLVANIA

The Aluminum Cooking Utensil Company, Inc.
302 Wear-Ever Building, New Kensington, Pa.

GENTLEMEN: *I'd like to know more about your new rectangular under-counter bin.*

☐ Send me your catalog. ☐ Have your representative see me.

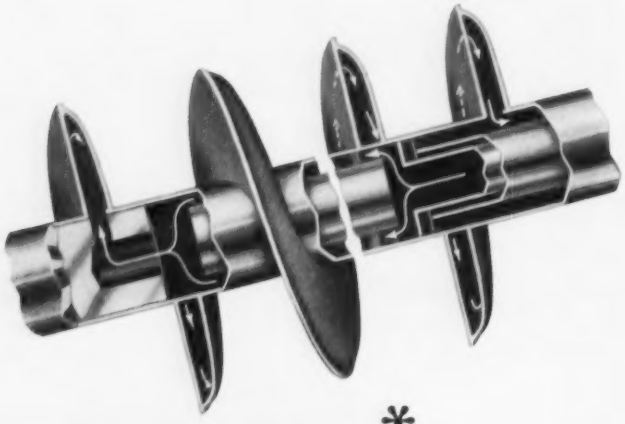
NAME .....

TITLE .....

Fill in, clip to your letterhead, and mail today.

For more data, circle this page number on card at back →

New savings in heat-exchange processes . . .

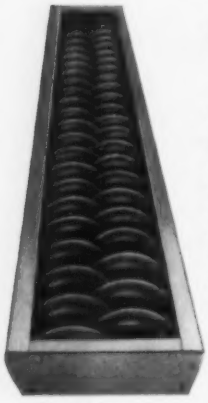


THE holo-flite* PROCESSOR
(HOLLOW-FLITE)

A simpler, more compact way to cool, heat or dry—in continuous flow!

Do you have processes where slurries, solids, pulps or pastes must be cooled, heated or dried? Do you know you can now handle such processes—*in continuous flow*—in as little as 1/5th the space required by other types of heat exchangers—and with many other important advantages?

The revolutionary HOLO-FLITE Processor is the answer!



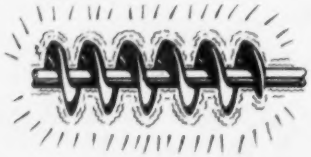
what IT IS!

Basically the HOLO-FLITE consists of two or more flights of hollow-bladed screw conveyors. The product to be processed moves in a trough around the conveyor screws. The heat-transfer fluid circulates through the hollow blades and shafts of the conveyor. The product is constantly rotated into, around, under and over the blades and shafts through which the heat-transfer fluid is circulating, assuring quick, uniform heat passage between the two mediums—*as the product is continuously moved along in a bulk-flow without interruptions!*

Our engineers will gladly study *your particular* operations and make recommendations. Write, wire or phone our nearest office!

why IT'S BETTER!

The HOLO-FLITE principle provides many important advantages in modern processing operations . . .



ITS LARGE HEAT-TRANSFER SURFACE requires far less space—as little as 1/5th the space required by other heat-exchange equipment. Further, flights can be "stacked" as high as desired to save floor space, simplify installation!

ITS SLOW ROTATION IS SO GENTLE that granular and powdered solids are handled with no dusting—little or no particle abrasion. Result—no dust recovery problems . . . simple, inexpensive installation.

IT IS ADAPTABLE to a wide range of applications—handles solids, pulps, pastes and slurries with equal ease. Heat transfer agent can be refrigerant, water or other fluids to provide a wide range of temperatures. Cooled products can be packed directly from HOLO-FLITE discharge, saving time, space and additional handling.

IT CAN BE DESIGNED to handle virtually any capacity by varying the diameter and length of the flights, and the number of "tiers."

FREE 8 PAGE bulletin describes Holo-Flite features and applications. Send for your copy!

COTTRELL Electrical Precipitators
MULTICLONE Mechanical Collectors
CMP Combination Units
DUALAIRE Reverse-Jet Filters
HOLO-FLITE Processors
*Reg. T.M.

Western Precipitation Corporation

Designers and Manufacturers of Equipment for Collection of Suspended Material from Gases . . . and Equipment for the Process Industries

Main Offices: **1016 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA**

Chrysler Building, New York 17 • 1 North La Salle Street Building, Chicago 2 • Oliver Building, Pittsburgh 22 • 3252 Peachtree Road N. E., Atlanta 5 • Hobart Building, San Francisco 4

Precipitation Company of Canada Ltd., Dominion Square Building, Montreal

Representatives in all principal cities

Edward A. Otocka has been named general manager of operations for National Biscuit Co., New York City. He succeeds Russell M. Shultz.

---

announces granting of the Fourth Annual Forty-Niner Service Award to Carlos Campbell, executive secretary of National Canners Assn.

Chas. Pfizer & Co., Inc., Brooklyn, reports election of Allan J. Greene to the newly-created post of administrative v.-p. He also will serve on executive committee of company.

Crown Cork & Seal Co., Inc., has elected Louis Yaeger to the board, and appointed Lesten V. Taylor senior product engineer in its research and development department.

Crown Zellerbach Corp., San Francisco, announces formation of jointly-owned St. Francisville (La.) Paper Co., which will build and operate a $31 million mill to make machine-coated printing paper.

Hatton B. Rogers is newly appointed v.-p. of Dodge & Olcott, Inc. He will work from the company's main offices in New York City.

Dewey & Almy Chemical Co., Cambridge, Mass., has elevated David G. Bernard to manager of container products in the container and chemical specialties division.

Food Research Laboratories, Inc., Long Island City, N. Y., directed by Dr. Bernard L. Oser, announces establishment of a western branch in Los Angeles.

Foster D. Snell, Inc., N.Y.C., announces acquisition of Seil, Putt & Rusby, Inc., N.Y.C.

Goulds Pumps, Inc., Seneca Falls, N. Y., has appointed Philip J. Olmstead chief engineer.

Premium Plastics, Inc., Chicago, has promoted Harold W. Hoots to sales manager.

St. Regis Paper Co. announces completion of transaction under which it is acquiring J. Neils Lumber Co., Portland, Ore.

Thatcher Glass Mfg. Co., Inc., Elmira, N. Y., has appointed Gerald J. Graham as v.-p.

Visking Corp., Chicago, announces it has now become Visking Co., Div. of Union Carbide & Carbon Corp.

Vulcan Steel Container Co., Birmingham, Ala., has named Fred A. Kusta general plant manager, and John Carson superintendent.

Ungerer & Co., Inc., New York City, has appointed Roy Hagelin sales manager.

Warner Electric Brake & Clutch Co., Chicago, has named Alonzo A. Nesse as board chairman.

York Corp., York, Pa., has named Stewart E. Lauer board chairman.

Deaths

William D. Atken, 52, president of Beverage Developers, Inc., Anaheim, Calif.

Roy M. Magnuson, 55, designer of food processing equipment and founder of Magnuson Engineers, Inc., San Jose, Calif.

Gordon Pickett Peyton, 48, secretary-treasurer and general counsel of both the Assn. of Cocoa & Chocolate Manufacturers of the U. S. and American Cocoa Research Institute.

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INSIDE SCIENCE

The Vital Story of VITAMIN C

by Science Writer

What does vitamin C do for human beings?

Medical research shows that it is essential in maintaining healthy bony tissue and for the formation of collagen which is the main supportive protein of skin, tendon, bone, cartilage and connective tissue. It is needed for vascular function and tissue respiration and in promoting the healing of wounds. In lactating women it has great importance in providing the infant with a sufficient amount of ascorbic acid to prevent scurvy, a disease to which very young babies are susceptible.

Much evidence is available in medical reports to show that a lack of this vital nutritive element can result in impaired health. And in those cases of frank scurvy which still occur, ascorbic acid is the specific medication.

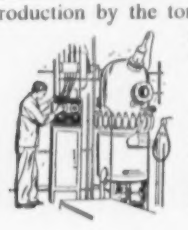
History. The history of vitamin C is fascinating. Scurvy, known for centuries, was once the most prevalent disease in Europe. It afflicted the Crusaders, decimated the crews of voyagers and armies, and plagued the colonists of the New World. In the 18th Century the antiscorbutic value of fresh vegetables and citrus fruits was recognized.

Isolation. It was not until 1918-25 that almost pure ascorbic acid was concentrated from the lemon by Zilva and its important properties and molecular composition established. In 1927 he concluded that this so-called "reducing factor" and the antiscorbutic principle were closely related. In 1928, Szent-Györgyi, who started investigations in 1921, isolated a strong reducing compound from adrenal glands, oranges, and cabbage and termed it "hexuronic acid."

Chemistry. The "reducing factor," "hexuronic acid," and vitamin C were all identified as the same in 1932 by various groups of workers. This was one year after C. G. King, by methods of organic chemistry and experimental physiology, established the chemical identification of vitamin C, thus fulfilling Budd's prediction of 90 years earlier that the antiscorbutic property of certain foods would ultimately be discovered to be a definite substance.

Synthesis. In 1933 Reichstein and his colleagues in Switzerland successfully synthesized ascorbic acid. Almost simultaneously in England Haworth and associates accomplished the same. The Reichstein synthesis formed the basis for large scale commercial production by the world-famous firm of Hoffmann-La Roche.

Production. Following these discoveries came the establishment of manufacturing operations so that today daily production by the tons is the rule. The figures are really staggering. The amount produced weekly in the U. S. A. averages over 15 tons, equivalent to that contained in over 200 million oranges. It is being made synthetically at a very low cost which permits widespread use in many food and drug products. One kilo is sufficient to supply 92 people for one year with the minimum daily requirements set by the U. S. Food and Drug Administration.



Vitamin C made by the Roche process is identical chemically and in biological activity with Nature's own product. Because vitamins can be manufactured at a much lower cost than if they were extracted from natural sources they are widely used in dietary supplements and pharmaceuticals. In fact, "New and Non-official Remedies," a publication of the American Medical Association for use by physicians states: "All pure ascorbic acid used in pharmaceutical products is prepared synthetically."

Ascorbic acid is present in many foods. Nature supplies some with lavish amounts and stints on others. In fact, wide variations* have been found in the vitamin C content in varieties of the same fruit.

Deficiencies. Many surveys have shown widespread vitamin C deficiencies in the population. Physicians may call these subclinical, but they are deficiencies nevertheless.

Because of these situations—natural variation and widespread deficiencies—diet experts believe that it is desirable and in the public interest to standardize the vitamin C content of processed fruit and vegetable juices by the addition of enough pure crystalline ascorbic acid to make them consistently dependable sources of this necessary food element. Some of these juices are: tomato, grape, orange, grapefruit, pineapple and apple.

Requirements. The U. S. Food & Drug Administration has set 30 milligrams as the adult minimum daily requirement of ascorbic acid. This daily intake is just about sufficient to prevent recognizable signs of vitamin C deficiencies although a subclinical or an unrecognized deficiency may exist. In view of this, the National Research Council has established 75 milligrams as the recommended daily male adult allowance and 70 mg. daily for female adults, which levels are supported by many controlled nutrition studies. However, the N. R. C. recommends 90 mg. daily for boys between 13 and 15, 100 mg. daily for boys between 16 and 20, and 150 mg. daily for lactating women.

This article is published in the interests of pharmaceutical manufacturers and food processors who make their good products better with essential, health-giving vitamin C. Reprints are freely available. Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 286 St. Paul Street, West; Montreal, Quebec.

*The table shows minimum and maximum levels of ascorbic acid in commercially canned juices. All figures are in milligrams per 100 grams of juice. Data from U. S. Department of Agriculture.

	Min.	*Max.*
Apple juice	0.2	3.6
Grape juice	0.0	4.7
Grapefruit juice	10.0	49.0
Orange juice	9.7	70.0
Pineapple juice	5.4	18.0
Tomato Juice	2.5	32.0

ADVANCES IN TECHNOLOGY

Coconut Flavored Drink

A method of producing coconut flavored beverages directly from fresh nut meats is covered by a recent patent.

Method comprises comminuting fresh coconut meats and mixing with sufficient 100-150F. water to give a syrupy consistency. Dispersion is pressed to separate coconut milk (containing oil and flavor) from pulp. Milk is allowed to stand at 65-80F. to permit oil and water portion to separate, but not long enough to produce fermentation.

Oil is heated to remove residual water, filtered to remove solid components, treated with alcohol and hot water to extract alcohol-soluble flavoring constituents.

Mixture is then cooled and separated into coconut oil and an aqueous alcohol solution containing essence of coconut. Latter is diluted, carbonated and bottled as a beverage.—U. S. Patent 2,776,891, Jan. 8, 1957.

Flexible Packaging Meats

Packaging odd shaped foods such as fish and meats which have easily deformable parts, by placing on a thin, flat, rigid base and wrapping with shrinkable imperforate material is the object of a recent patent.

In the case of eviscerated fish, base sheet should be as wide as tail fins, and as long as the fish. A fish is placed on both sides of the sheet and the unit enclosed in an envelope of thin, pliable, imperforate material that shrinks when heated.

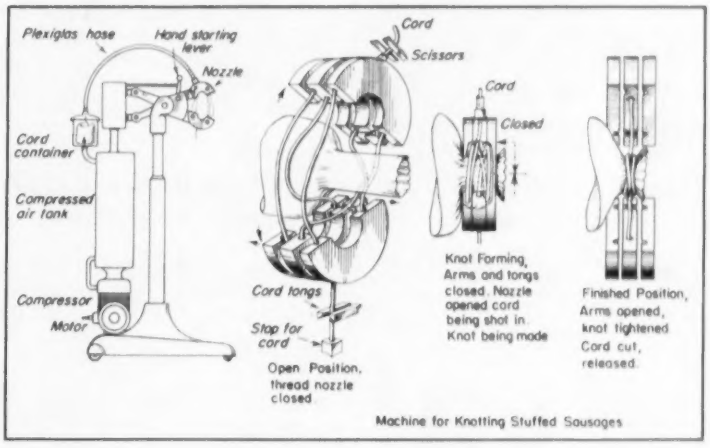
Envelope is evacuated to collapse wrapper and fish and remove air pockets, then closed and heated to temperature required to shrink it tightly against all exposed surfaces of the food.—U. S. Patent 2,776,216, Jan. 1, 1957.

Improved Brewing Process

Treating wort to remove materials responsible for chill haze in beer is the subject of a recently patented process.

Wort is cooled from boiling to about 2 deg. above freezing and held at this temperature until soluble materials that settled out during cooling are redissolved, and insoluble ones have coagulated.

Then wort is separated from insolubles, reheated to starting temperature, and fermented in the conventional way.—U. S. Patent 2,775,521, Jan. 1, 1957.



Machine for Knotting Stuffed Sausages

Air Operated Knot Forming Machine Speeds Tying of Sausage Casings

A machine that employs compressed air to form and tie knots in products such as casings for sausage and other foods, and operates at higher speeds than units employing sliding and rolling parts, has been developed in Germany.

The unit comprises a motor driven air compressor, air storage tank, cord container, Plexiglas cord-transporting tube, cord-guiding shear segments and synchronized clamping and cutting mechanism.

Inner surface of upper and lower parts of shears comprise 3 segments that provide knot-forming channels. When shears are closed, segments form a circular support for casing.

Machine is operated by foot pedal or pushbutton.

When the unit is started and the shears are closed, a nozzle in upper jaw opens and allows compressed air (80 psi. pressure) to "shoot" cord through Plexiglas tube and knot-forming channels, and into clamping device in lower jaw. Jaws are now opened allowing loose knot to fall around casing. (See drawing above for details.)

A clamping device in upper jaw tightens knot as shears are opened. Simultaneously, scissors on this jaw cut cord, and clamp on lower jaw releases other end.—McGraw-Hill World News.

Invert Sugar Solution

Sterile water-white solutions of invert sugar can be prepared by hydrolyzing sucrose in aqueous solution, provided conditions of pH, temperature, concentration, and oxidation are precisely controlled.

The patented process yields a product specially suited to therapeutic use as an alternative for glucose, although it may also be used as an ingredient of beverages and confections.

It contains a minimum quantity of the decomposition product of levulose and is substantially free from 5-hydroxymethylfurfural. It is stable for as long as a year at room temperature.

Inversion is effected by hydrolyzing 98-99.9% of the sucrose in an aqueous solution having a pH of 0.0-4.0 in absence of an oxidizing agent and at a temperature of 0-257 F. Concentration of the sucrose prior to hydrolysis should be not more than

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30% when hydrolysis is effected at a pH above 3.0 and not more than 10% when effected above 3.5.

A convenient method of removing most of the oxygen is to adjust pH of solution to 2.0 or lower with hydrochloric acid followed by addition of a non-toxic carbonate until the pH is within the range of 2.3 and 3.0, thereby replacing the oxygen in the solution by CO_2.—U. S. Patent 2,758,040, Aug. 7, 1956.

New Color Units and Chart Ease Sugar Color Checks

Liquid sugar products can be easily compared for color, and checks quickly and accurately made on changes that occur during processing and bleaching, by use of fundamental units (NBS Units) and a color scale recently developed at the National Bureau of Standards. A further use is in predicting color of a mixture from those of its component.

Scale is obtained by using an empirical formula to evaluate perceptible difference between color of a commercial sugar and that of a highly purified colorless sucrose solution. It permits use of a single number to represent visual appearance.

In practice the color of a sugar solution in NBS units is obtained from a simple chart without calculations, once the transmittancy of the solution at two wavelengths—420 and 560 μ, is known.

The chart consists of a series of plotted curves, each curve representing a given value of sugar color in NBS units. The 2 axes on which the curves are plotted are graduated in terms of attenuancy (reciprocal of transmittancy) of a sugar solution at the above 2 wavelengths, respectively. Thus, any pair of values of transmittancy at the 2 wavelengths determines a point on the chart.

If the point falls on one of the curves, its value in units of sugar color is obtained from the curve. Otherwise its value is found by interpolation.—*Summary Technical Report* 2073, National Bureau of Standards, Washington 25, D. C.

Formation of Reductones In Kilning and Brewing

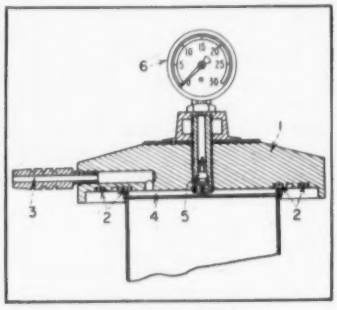
It is generally agreed that stability of beer is improved if it is "well-poised", that is if it contains a sufficient supply of reducing substances that protect it against oxidation by the atmospheric oxygen.

Use of added reducing substances such as ascorbic acid being contrary to the "Reinheitsgebot", or beer purity law of Bavaria, natural reducing substances or reductones from malt must be relied on for increasing the poise.

Malts that are "aromatized", that is heated to 276 F. for 15-20 min., yield grists in which the melanoidins and reductones are increased. Such malts yield worts and beers containing an increased reductone content as shown by a greatly reduced Indicator Time Test (ITT), but they are also much darker in color. However, a 10% addition of "aromatized" malt reduces the ITT appreciably without greatly increasing the color of beers that are not too pale.

Kilning-off temperature affects ITT of beer produced with it but mashing procedure and hopping rate may offset the lower ITT-producing effect of higher temperature kilning. Type of kettle used also has an effect, but this is modified by the type of beer brewed.

A highly hopped Pilsner type boiled in a direct-fired kettle yielded a beer of ITT 720 sec.; a steam-heated kettle an ITT of 600 sec. On the other hand a fire-heated kettle with the same raw materials used in the brew but a reduced hopping rate produced an export beer of ITT 350 compared to 420 for a steam-heated kettle.—*Brauwissenschaft*, 9(7), 176-81, 1956.



Simple Vacuum Tester For Canned Foods

An inexpensive apparatus for determining degree of vacuum in sealed cans is covered by a recent patent.

Unit comprises disk shaped closure (1 in illustration above) with gasketed grooves (2) located so gasket will contact raised portion of end seam of can. (Closure shown has two grooves for different size cans.)

Closure also has a capillary passage (3) for evacuating space (4) between

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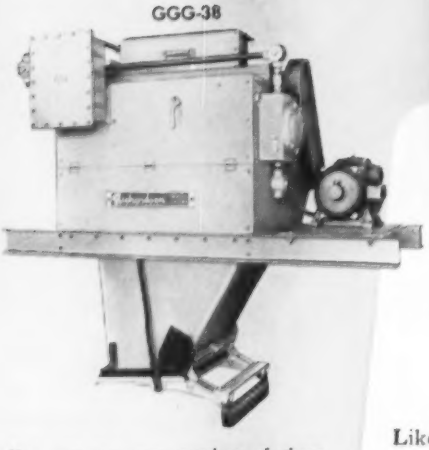

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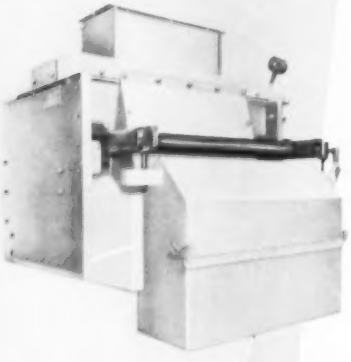

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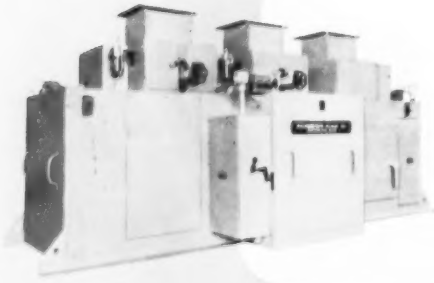

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can lid and tester, air valve (5) which is threaded into unit so that its end projects into air space. Distance from end of valve to can top is adjustable. Vacuum gage (6) is connected to air space (4).

In operation, unit is placed on can and suction applied to space (4). When sufficient vacuum is developed, can lid will flex (due to greater pressure within the can) and push up air valve, admitting air to closed space. This reduces vacuum and permits lid to return to original, flat position. Air valve then closes.

Result is a fluctuation of vacuum gage about a mean value that will differ from actual vacuum within can by an amount depending on type of container and distance between lid and air valve. Apparatus may be calibrated to give true vacuum within cans by using containers of known degrees of vacuum.—Australian Patent No. 10533/55, May 7, 1956.

Decimal Reduction Times And Their Estimation

Resistance of microorganisms to a particular temperature, presumed to be lethal to them, may be expressed by a parameter D (or Z), time in minutes required to kill 90% of the organisms.

Calculation of D is based on survival at temperature under consideration, and this is determined by a count of sterile and viable samples exposed for various periods to the lethal temperature.

D values calculated in this way have been shown to increase with increasing length of the heating period, a result that casts doubt on exponential survival relationships.

There is, however, a systematic bias in this method of calculation that is responsible for the apparent increase of D with temperature. It results from rejection of observations when all samples show growth, as in short periods of heating, and also of those where no sample shows growth, as in long periods of heating.

The log-log or Spearman-Kärber methods of calculating D avoid this bias. Confidence limit calculations for the binomially distributed data pertaining to calculations of D have also been made and tabulated.—*Applied Microbiology* 4(4), 211-21, 1956.

Soy-Corn Food Product

A non-oily, dry, compressed cereal food product comprising a substantially homogeneous blend of grain and oil seed, and the method of preparing it, are objects of a recently issued patent.

Basic ingredients of the product are soy beans and corn, each dried to less than 11% moisture. These are passed through separate cracking rolls then proportioned into a rotary mixer and dryer (255-275F.) where moisture content is reduced below 3%. Blend is such as to give product containing 3-6% oil.

Mixture is fed to rotary screw press operating at 3,000+ psi., and 250F. Extruded product is tempered to insure uniform moisture content, granulated to large pea size, sifted to remove fines, and packaged. Fines are returned to mixer-dryer.—U.S. Patent 2,774,670, Dec. 18, 1956.

Proper Pasteurization Kills Q Fever Organisms in Milk

Present HTST standard for pasteurization of milk (161F. for 15 sec.) seems to be adequate to destroy *C. burnetii* the Q Fever organism. However the minimum standard for the batch method—143F. for 30 min.—is not adequate. When this is raised to 145F. for 30 min. the organism will be eliminated.

These conclusions are based on extensive cooperative studies conducted in Calif. They were designed to determine times and temperatures needed to eliminate the causative rickettsiae from cows milk.

Checked were raw milk supplies of three cities, retail milk from different areas of the state, and milk from 137 individual cows in a herd known to be infected with *C. burnetii*.

Of 109 samples from the first lot, 8 contained the organism in demonstrable numbers. Of 376 retail milk and cream samples, 14 raw and 1 pasteurized contained the organism. Of the herd, milk from 18 cows was found to contain the rickettsiae. —*J. Milk & Food Tech.*, 313-18, Nov. 1956.

Improving Milk Products

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dried milk, and condensed milk. The invention also contemplates inclusion of H_2O_2, especially when composition contains an acid.

Apparent effect of the additive is a physiochemical action that raises the oxidation level and influences the action of anaerobic bacteria.

Percentages by weight of components that give effective results are: (*a*) glycerol 73, N-hydrochloric acid 27; (*b*) glycerol 73, solid NaOH 27; (*c*) glycerol 32, N-HCl 12, 30%-H_2O_2 56; (*d*) glycerol 90, solid KOH 10; (*e*) glycerol 85, solid Na_2CO_3 15; (*f*) glycerol 77, solid boric acid 8, 1/10 N-HCl 15.

Compositions *a*, *b*, *d*, *e*, and *f* may be used in the proportion of 5 g. per 100 kg. milk; composition *c* at the rate of 12-15g. per 100 kg. milk. Different compositions are used, depending on product being made. Examples are given in the patent specifications.—U.S. Patent 2,758,925, Aug. 14, 1956.

Fat Stabilization Possible During Rendering Process

Lard and edible beef fats can be stabilized effectively with phenolic antioxidants during pressure steam rendering. But when synergistic mixtures are employed best results are obtained by adding immediately after rendering.

This was demonstrated by laboratory- and plant-scale rendering tests using the following; (1) BHA, (2) BHT, (3) propyl gallate and citric acid (PC), (4) propyl gallate, citric acid and BHA (APC), and (5) BHA and BHT (AT).

In lab experiments with lard BHA or BHT gave satisfactory stabilization at 0.01% levels, and both APC and AT gave excellent results at 0.05%. PC had relatively little stabilizing effect. In plant tests PC gave somewhat more satisfactory results than in the lab, and BHA was slightly more effective than BHT.

Lab tests with beef fats showed PC to be relatively ineffective. Best results for a given level were observed with BHA alone.

The ineffectiveness of PC and APC is explained in part by their relatively high solubility in the aqueous phase.—*J. of the Amer. Oil Chemists' Soc.*, 381-83, Sept. 1956

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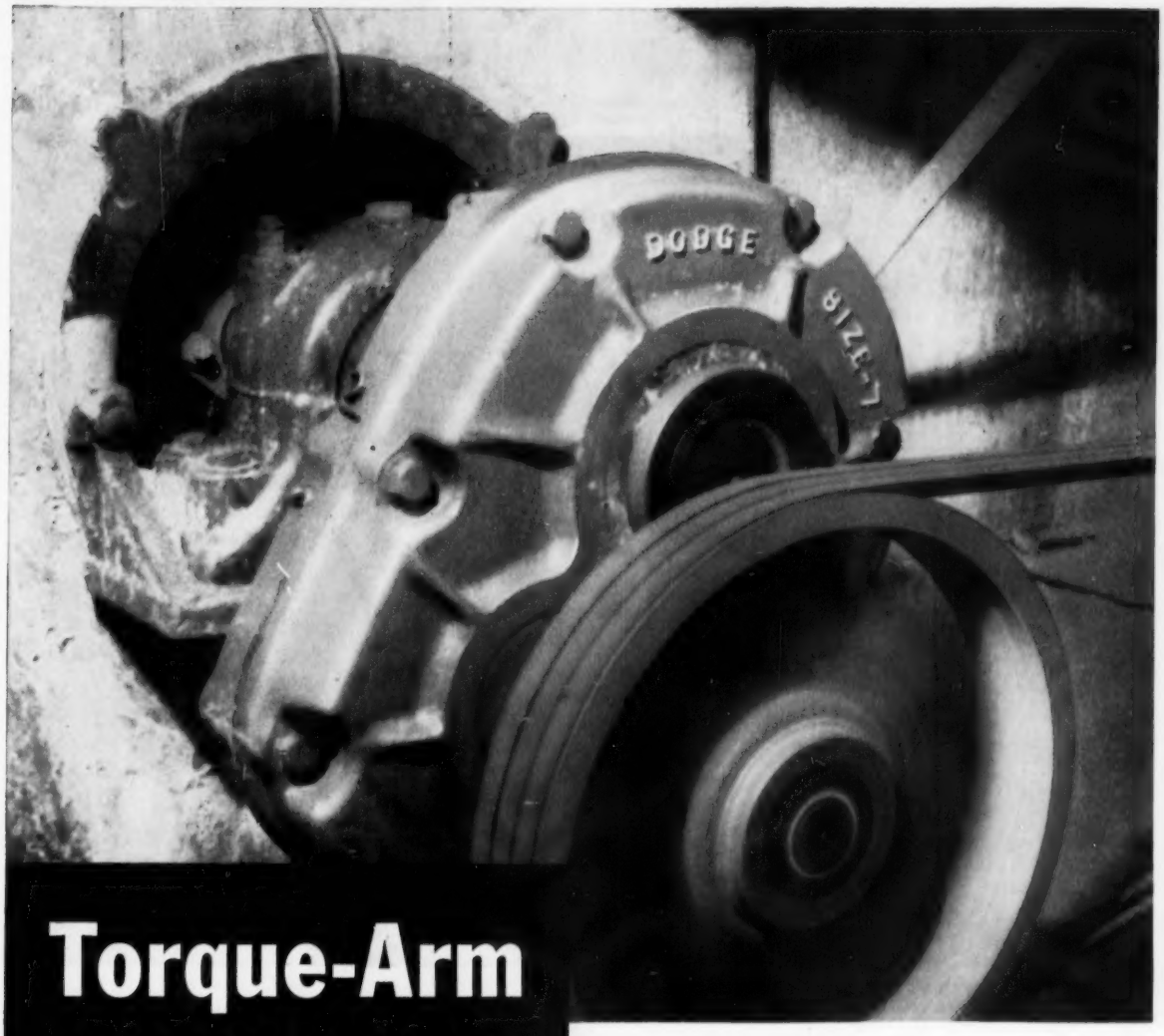

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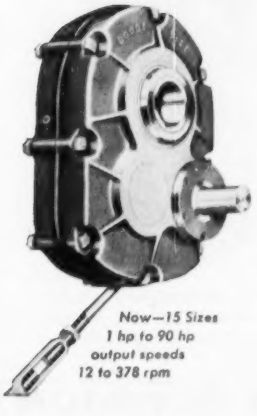

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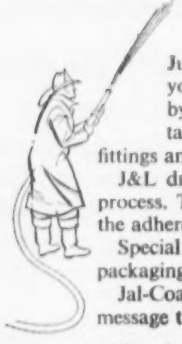

Just as valiant firemen are on around-the-clock alert to protect your life and property—J&L Steel Containers protect your products by providing dependable packaging that assures safety in transportation and storage. Their precise fabrication assures accuracy in all fittings and closures.

J&L drums and pails are chemically cleaned and dried by the JaLizing process. This assures a clean and dry, rust-inhibiting surface and increases the adherence and durability of decoration and interior lining.

Special protective interior linings are available to provide the best possible packaging for your products.

Jal-Coat, J&L's lithographing process, applies your trademark and sales message to the finished container . . . *no side seam touch-up is ever required.*

Plants located at Atlanta, Ga.; Bayonne, N. J.; Cleveland, Ohio; Kansas City, Kansas; Lancaster, Pa.; New Orleans, La.; Philadelphia, Pa.; Port Arthur, Texas; and Toledo, Ohio.

JaLiner, J&L's integral plastic contour liner, is designed to solve "hard-to-package" problems.

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tem is the object of a recently issued patent on tank design.

Tank is preferably rectangular in its upper portion and semi-cylindrical below. Liquid waste is introduced at one end by means of a submerged header. At the same end is a weir with adjustable lower lip adapted to discharge part of the liquid that is to be recirculated.

At opposite end of tank is a second weir adapted to discharge finished effluent. Settled solids are removed through an outlet in center of semi-cylindrical bottom, being forced from each end by rotary scrapers closely fitting the rounded bottom and having reversely pitched vanes on opposite sides of center.

Thus a single unit serves as a settling tank in which solids are mechanically moved to a central outlet, as a flow division box by returning one portion of the flow for further treatment while passing another portion to the receiving stream as clarified effluent and as a weir box and sampling station.—U.S. Patent 2,749,302, July 31, 1956.

Counter-Current Drying Does Not Damage Wheat

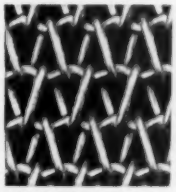
Basic engineering requirements for drying of wheat in a counter-current system have been calculated and verified in an experimental unit that proved the suitability of this method.

Amount of moisture removed from bed of grain per unit of time varies directly with dry bulb temperature of air used. At high rates of air flow it is limited by internal resistance of the grain to moisture movement, and becomes noticeable at 10 psi/sq. ft./min., or 1.82 cu. ft./min./lb. of wheat.

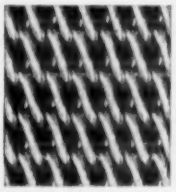
Depth of grain bed becomes optimum at about 2 ft. as moisture in outlet air does not increase for greater depths. Amount of water removed per unit of time becomes constant at a wheat-flow rate of 90 lb./sq. ft./hr. Moisture removal rate increases with initial moisture content of the wheat.

While wheat may withstand high temperatures without serious injury (185F. for 110 min. did not damage baking quality of wheat with 7% moisture), drying temperatures must be lower for high moisture wheats. If it is to be used for seed purposes, maximum dry bulb temperature should not exceed 120F.—*J. of Sc. of Food & Agr.* 7 (11), 721-28, 1956.

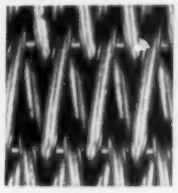
How to select WIRE MESH CONVEYOR BELTS for Continuous FOOD PROCESSING



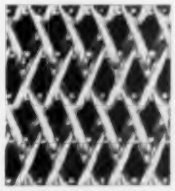
BALANCED—High tensile strength, low ultimate cost belting for operation up to 1300°F. Resists distortion. Designed for straight travel.



DUPLEX—Compact structure of great density provides high tensile strength. The close mesh provides smooth surface for carrying small products such as peas, pelletized feed.



GRATEX—Close spirals retain the advantages of Balanced weave, while producing a semi-closed mesh and adding strength. For cold, medium and some high temperature applications.



DOUBLE-BALANCED—A widely used weave, combining open mesh of Balanced weave with strength of Gratex. For cold, medium and some high temperature applications such as freezing and baking.

As you know, wire mesh conveyor belts are widely used for combining movement with processing in many continuous food processing operations—washing, blanching, freezing, baking, etc.—largely because of the need for increased operating efficiency and improved sanitation in handling.

However, there is no single type of belt construction suitable for all food processing operations. Some require rather fine mesh for handling such products as peas or cut vegetables; some high resistance to the corrosive attack of food acids and salt; others must be constructed for high temperature or sub-zero service in baking or freezing. That's why Cambridge has nine basic weaves available in any metal or alloy. The four shown here are the most widely used in food processing.

There are several factors that generally influence selection of weave, mesh size and metal or alloy from which the belt will be woven. Among them are: size, shape and consistency of the product to be handled; temperatures to which belt will be subjected; presence of wet or corrosive conditions. Even after these have been decided, overall belt construction must be designed to meet individual requirements—type of drive, selvage, support and special surface attachments must be selected.

You can see, then, that designing for continuous food processing with wire mesh conveyor belts is not a simple "nuts and bolts" job. Ramifications build up rapidly to demand the service of a specialist. That's why Cambridge maintains a staff of competent Field Engineers to help you select the Wire Mesh Conveyor Belt to make your installation most efficient. You can rely on the experience of these engineers to specify just the right belt for you. In addition, they are thoroughly familiar with basic conveyor design. For the name of your nearest Cambridge Field Engineer, look under "Belting, Mechanical" in your classified telephone book. Or, write direct. Also ask for 130-page Reference Manual of specifications and design information.

THE CAMBRIDGE WIRE CLOTH COMPANY, DEPT. Q, CAMBRIDGE 2, MARYLAND.

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The LYTTON Co-op Creamery, Lytton, Iowa, has developed an extremely efficient dry milk processing operation, which utilizes the Buflovak "Spray-Dry" process.

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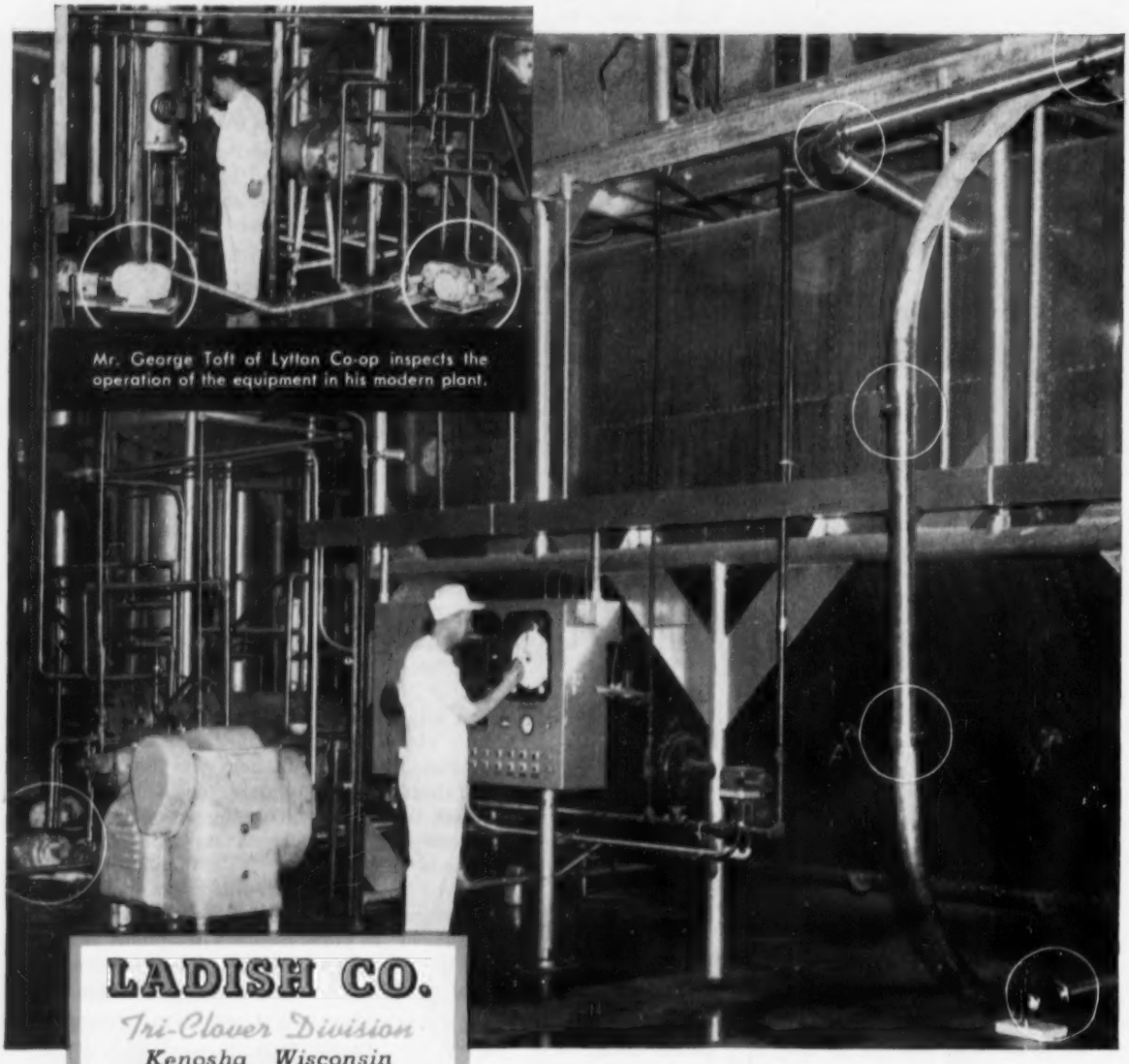
Tri-Clover fittings, valves, pumps and tubing are selected for jobs like this because of their reputation for highest quality materials and workmanship . . . and for the fact that they meet the strictest sanitary requirements.

Our engineering service is at your disposal to help solve your corrosion-resistant piping and pumping problems.

Call or write for further information.



Mr. George Toft of Lytton Co-op inspects the operation of the equipment in his modern plant.

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Directly above are some of the 3" O.D. Tri-Clamp fittings used on piping for pneumatic conveying of dry milk. Note other Tri-Clover fittings and pump at left.

5856

QUESTIONS & ANSWERS

THIS MONTH'S PROBLEM

Handling Shortening

Question—We have a material-handling problem entailing much labor that could be saved if it were solved. We use considerable of plastic "Crisco"-type shortening in our cake mixes. Due to density variations, amount needed for each batch must be weighed in this way:

Shortening in 55-gal. metal drums is unloaded by hand truck and placed in a tempering room (75-80 F.). It is then hand-trucked to point of use and shoveled out of drums (with short D-handled shovels) into a bin mounted on a scale. From bins, it is again shoveled into a pneumatically operated "shortening stuffer."

Shortening is placed on top of the air-operated piston within a cylinder. Then cover is clamped on top of the cylinder, and shortening is "stuffed" (by compressed air) into a mixer with other ingredients. Biggest part of this job is shoveling the shortening. Can this problem be solved?

DECEMBER PROBLEM

The Question Was—Can you outline a good basic formula for preparing a canned German potato salad?

Answer—A canned German-style potato salad that I've formulated might prove satisfactory as to appearance, texture, and flavor when produced on a commercial basis.

The formula:

Sliced potatoes (old)	25½ lb.
Fried bacon	2½ lb.
Cider vinegar (50 grains)	2¾ lb.
Water	2 gal.
Dehydrated minced onion	6 oz.
Wheat flour (soft)	18 oz.
Salt	6 oz.
Potato-salad seasoning (W. J. Stange Co.)	6 oz.

Preparation: Bring to boil, in jacketed kettle, onions, salt, flour, potato-salad seasoning, vinegar, and water. Reduce heat so batch simmers 15-20 min. prior to filling. Meanwhile, pare potatoes and cut into ⅛-in. slices. Fry bacon crisp and break into small pieces.

Sauce, fried bacon, and sliced potatoes can be added together and filled into cans. Or sliced potatoes can be separately added into cans, bacon being mixed with the sauce and then filled into cans containing potatoes with a sauce filler.

Approximately 8 oz. of sliced potatoes and sauce for a 15-oz. net weight are filled into 300x407 cans. Process at 240F. for 45 min.

If there should be any difficulty in filling fresh sliced potatoes into cans, try using dehydrated potato slices.—*Phillip J. Brady, Food Technologist, Vancouver, B.C. Canada.*

Thermometer in Kettle

Question—We have a jacketed cooking kettle fitted with a double-motion, scraper-type, motor-driven agitator. To check product temperature, we have to stop the agitator and insert a long thermometer.

Our quality-control department has asked us to equip this kettle with an automatic indicating-type temperature controller. But we don't see how the instrument bulb can be installed in this kettle, because of agitator interference. Can you suggest a solution?

Answer—There are several possibilities. One would be to cut out a section of the agitator so that a temperature-controller bulb could be installed at outer edge of kettle. But there are disadvantages—reduced efficiency of scrapers and possibility of indicated temperature being influenced by temperature of the kettle jacket itself. This may or may not be a serious feature with your product (a matter only you can judge).

It might also be possible to compensate the instrument to allow for jacket temperature.

A second approach would be to use an electric instrument, with temperature being sensed by a tiny thermocouple junction. Possibly, the best way to run wires from junction to instrument would be to bring them out through kettle outlet where they do not interfere with the agitator.

To bring the wires out at top would require running them upward along the agitator shaft. A rotating commutator-type pickup would then be needed to make the connection to the outside instrument. This could cause considerable trouble under moist operating conditions.

A third solution would seem to be more practical than the first two. It involves use of a special type of instrument—a bulb of the "flush" type. It is designed for just such an application and measures temperature by means of a button in the kettle wall, thus does not interfere with agitator. It must be inserted through kettle wall according to instrument company's specifications. Then it is properly insulated from steam in the jacket and gives a true product reading.

Of course there is still another possible solution. We merely mention it because it does not entirely fit the conditions you've outlined. Remove the scraper-type agitator and try to agitate the product with one or two portable propeller-type units clamped to the kettle. If this works, you can use a standard instrument bulb.

Making Pipelines Safe

Question—For some time, we have wanted to install a glass pipeline for one of our products, since it might offer certain advantages. However, it happens that our product is very hot, and that the pipeline has to pass over an area where people are working.

Therefore, our safety director will not approve our plans because he is fearful of possible line breakage. We are hoping that there may be some way to safeguard such an installation so as to overcome this objection. Is there any way this might be accomplished?

HOW TO DO IT?

Readers are invited to submit to FOOD ENGINEERING answers to question, "This Month's Problem." Selected answers will be published with credit (unless you specify otherwise). We pay space rates.

JUST ASK US

Subscribers also are invited to send in food engineering questions. We undertake to provide answers, free, to the best of our ability. We do not undertake costly investigations. Give full information and your name. Your identity will not be disclosed.

Write to Questions & Answers Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.

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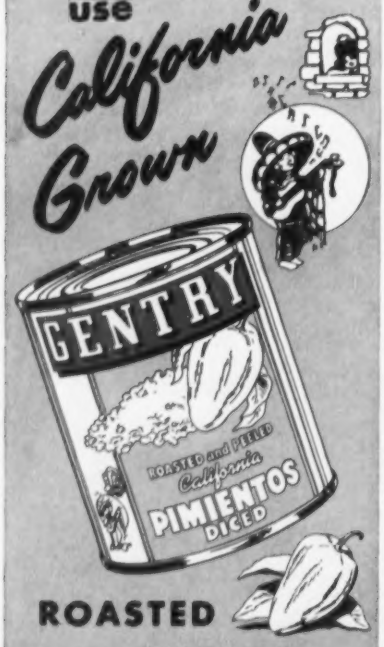

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Answer—It is now possible to obtain glass pipe, fitted with what is known as "armor." It is a Fiberglas sleeve impregnated with a polyester resin.

This does not actually strengthen the pipe—the safe operating pressures remain the same.

However, it should be very helpful to you in your particular case, because its chief purpose is to hold the glass together and prevent gross leakage in event of pipe failure. Instances are known where the armor has held line pressures long enough to shut valves, open drains, and prevent excessive product loss.

It should be pointed out that special flanges and longer bolts are required, and that the cost is somewhat higher than for ordinary glass pipe. In your case, the added safety factor might well be worth the difference.

If your pipeline is exposed to severe mechanical dangers, it would doubtless be wise to protect it with channel iron guards.

Q.–Have you a barbecue sauce formula?

A.–Blend 6 lb. of tomato juice, 1 lb. of vegetable oil (corn or cottonseed), 1 lb. of Worcestershire sauce, 3 qt. of distilled vinegar, 2 lb. of grated onion, ½ oz. of minced garlic, ½ oz. of cayenne, 3 oz. of paprika, 3 oz. of dry mustard, 4 oz. of salt and 3 oz. of ground pepper.

Going to Bulk Oil

Question—With the growth of our business, we now find the volume of corn, cottonseed, and soya oils justifies going into tank-car deliveries and bulk oil-storage tanks. Are there any special precautions to be taken, from a quality standpoint, in installing and using bulk tanks?

Answer—In planning your installation, make sure that no copper, brass, or bronze come in contact with the oil. They're harmful since they accelerate rancidity.

It's well to initially install the tanks with provision for adequate cleaning. Over a period of time, it is possible for sludge to accumulate on tank bottom. And this calls for certain precautions.

Outlet pipe from tank should be located high enough so that it will not draw sediment from tank bottom. Might be a good idea to extend it about 6 in. above tank bottom. It would also be helpful to arrange inlet pipe so that incoming oil does not stir up sediment that might be present (as by directing it against side of tank).

Then, to remove whatever sediment does accumulate, manholes should be provided for access by a cleanup crew. If the tank is installed with a slight pitch and provided at the low end with drain plugs, sludge removal can be facilitated.

If you wish to maintain maximum standards of cleanliness, plan to clean the tank interior surfaces occasionally with a hot detergent solution. This is best accomplished by means of pressure jets or sprays, which can either be mounted permanently in the tanks or inserted when cleaning is to be done.

Some of these devices are designed to spray cleaning solution over the entire interior and remove any film that may be formed through alternate filling and emptying. Obvious advantage of such equipment is that it eliminates need for cleanup crew to work with hot solutions inside the tank.

Occasional cleaning of tanks must be followed by prompt application of a new coating of fresh oil if rusting of the steel tank surfaces is to be prevented.

It is suggested that tanks be located in the basement or in as cool a spot as can be provided. It would also be well to equip them with temperature recorders, or at least thermometers, so that you can be satisfied that holding temperatures are not excessive. Some processors pass bulk-oil through a cooler on arrival during warm weather before storing it. Otherwise, it would stay warm for a considerable period and its freshness might be impaired.

Re Floating Curd

Question—We were especially interested in the article, "How to Avoid 'Floating Curd' When Making Cottage Cheese" (FE Jan., p. 84). Could you possibly direct us to further reading?

Answer—Authors W. E. Sandine, A. W. Anderson, and P. R. Elliker have given us the bibliography they employed relative to the studies reported in their article. This list of references, which should prove helpful to you, follows:

Albrecht, T. W., and Ashe, F. E. "Slit-Openess Defect in Cheddar Cheese." *J. Dairy Sci.*, 38: 29. 1955.

Allen, L. A. "Methods of Measuring Gas Production." *J. Dairy Res.*, 10: 1. 1939.

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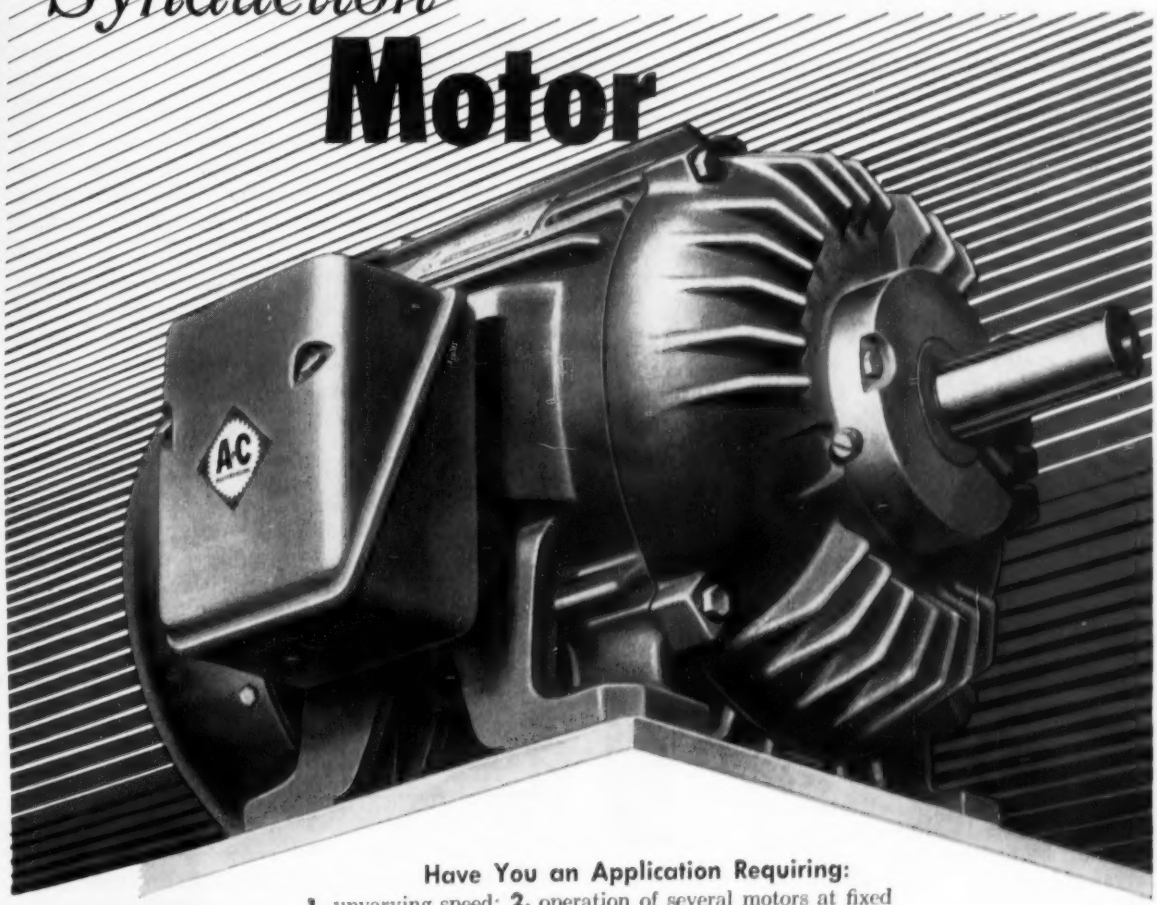

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PHILOLOGY and FILTERAIDS

Joseph Conrad speaks of words "debased by centuries of careless usage," and a glance in any good dictionary does show that many of our everyday words no longer have any clear-cut meaning. This is particularly true in the field of filtration, where many people become confused between filteraid quality and filteraid grade. This confusion is probably compounded by the diatomite industry practice of naming their different filteraids, rather than designating them by a simple direct-reading grade designation.

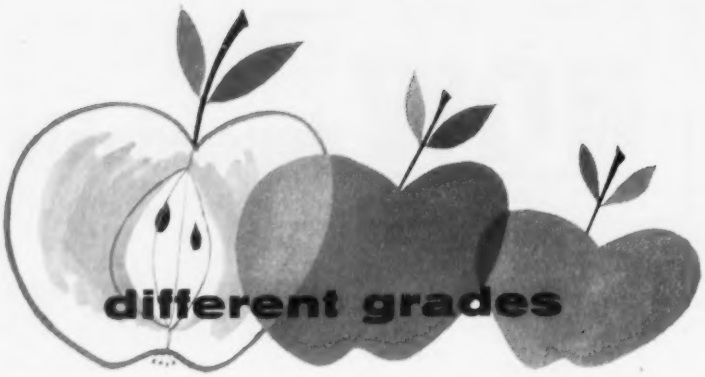
We might better talk of filteraid efficiency — the ability to give maximum throughput with consistent clarity at minimum dosage. This high performance is essential both for your product quality and to hold operating costs in line. There are many cases where the production rate of an entire plant depends directly upon the output of the filter station. And high performance is a function of *both* quality and grade.

In diatomite filteraids, quality and grade are not the same thing. Every major filteraid supplier has available a series of grades, ranging from a fine particle size grade to a coarse particle grade, with flowrate increasing and clarity decreasing as the particle size increases. This series permits matching the filteraid to the characteristic of the feed liquor.

However, filteraids from different suppliers may be equivalent in grade but vastly different in quality or efficiency. The poor quality material may develop flowrate equal to the better material but be inferior in clarity. Or, clarity may be achieved at the expense of flowrate. The most common weakness, however, of poorer quality filteraids is their inability to cope with the occasional tough batch of liquor encountered in almost every plant.

This property — the ability to handle the tough batch, at economically sound dosage — is the true test of a top quality filteraid. This characteristic is not built into a filteraid by accident. It takes sound experimental work, based on years of experience in filtration, to develop the basic information as to particle size distribution and other characteristics required in a good filteraid. And, to make this knowledge effective, quality filteraid production must be backed by control of reserves of high quality raw materials, together with milling and sizing equipment which will process the material within the very narrow limits imposed by a system of rigid quality controls. To date, this is the only known method to insure top quality in diatomite filteraids.

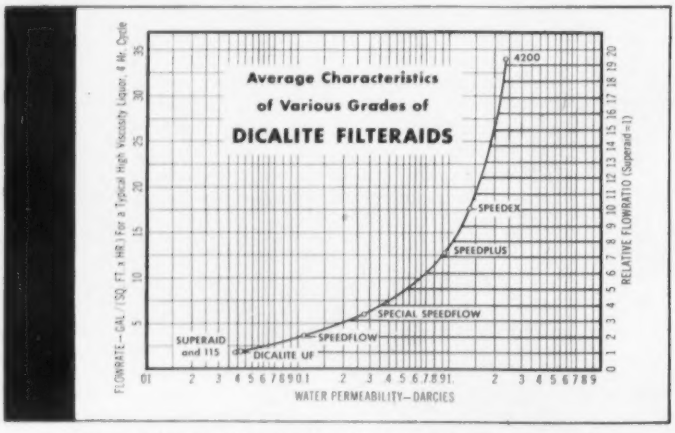
P. W. Leppla
Technical Director



...but just one quality!

Filteraids and certain kinds of fruit have this one thing in common — that *grade* is a matter of size, and has no reference to quality. The smaller fruit may be the equal of the larger in everything but size.

Filteraid quality means the highest possible degree of clarification for the grade employed, at greatest throughput per quantity of filteraid. Dicalite achieves this high quality—in every grade—by (1) careful selection of the crude diatomite from Dicalite's four high-grade deposits; (2) processing with the industry's most modern equipment, and (3) the industry's most rigid quality control system, which assures the same carefully controlled particle size range and distribution for each grade, uniformly, dependably, lot after lot. Which may explain why so many leading firms in every branch of processing have standardized on Dicalite Filteraids.



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Dependable GLC GREAT LAKES **Dicalite®** DIATOMACEOUS MATERIALS

dicalite division, great lakes carbon corporation 612 south flower st., los angeles, california

Evans, A. C. "A Study of the Streptococci Concerned in Cheese Ripening." *J. of Agr. Res., 13:* 235. 1918.

Galesloat, T. E. "An Early Gas Defect in Cheese Caused by Betacoccus (Leuconostoc) Species." *Neth. Milk & Dairy J., 4:* 274. 1950.

Gibson, T., and Abdel-Malek, Y. "The Formation of CO_2 by Lactic Acid Bacteria and *Bacillus licheniformis* and a Cultural Method for Detecting the Process." *J. Dairy Res., 14:* 35. 1944.

Gunsalus, I. C., and Campbell, J. J. R. "Fermentation of Citric Acid by Homofermentative Lactic Acid Bacteria." *J. Bact., 44:* 721. 1942.

Q—Have you any pointers on preventing rancity when blending peanut butter and cheese to make a biscuit filling?

A—Both cheese and peanut butter are very stable. Perhaps combining both results in what appears to be a "rancid" product. In fact, some of our meat-packing friends advise us that when bacon is combined with processed cheese, the resulting spread seems to have a rancid taste, despite the fact that the product is really not rancid.

Hassouna, M. M., and Allen, L. A. "Gas Production by *Bacterium Coli* and by Lactic Acid Streptococci under Different Conditions." *J. Dairy Res. 10:* 7. 1939.

Krishnaswamy, M. A., and Babel, F. J. "Biacetyl Productions by Cultures of Lactic Acid-Producing Streptococci." *J. Dairy Sci., 34:* 374. 1951.

Moore, A. V. "Floating Cottage Cheese Curd Made From Reconstituted Nonfat Dry Milk Solids." *J. Dairy Sci., 39:* 918. 1956.

Overcast, W. W., and Albrecht, T. W. "Gas Production in Cheddar Cheese by *Leuconostoc citrovorum*." *J. Dairy Sci., 35:* 554. 1952.

Price, W. V. "Open Texture or Late Gassy Defect in Ripening Cheese." *Milk Prod. J., 45* (1): 22. 1954.

Q.—Is it a good idea to add strawberries when packaging ice cream?

A.—Up to now, test results have shown no advantages.

Prouty, C. C., and Golding, N. S. "The Action of the Associate Starter Organisms in American Cheddar Cheese." *J. Dairy Sci., 29:* 495. 1946.

Sherman, J. M. "The Gas Production of *Streptococcus kefir*." *J. Bact. 6:* 127. 1921.

Sherwood, I. R. "The Relations of Certain Lactic Acid Bacteria to Open Texture in Cheddar Cheese." *J. Dairy Res., 10:* 326. 1939.

Zielinska, M., and Hiscox, E. R. "Aroma-producing Streptococci Isolated From Cheddar Cheese Curd." *J. Dairy Res., 21:* 238. 1954.

Color Guide for Sauces

Question—Have you any ideas on color charts or guides that could be used in making sauces and gravies with same color batch-for-batch?

Answer—You might borrow an idea from egg-yolk processors. They employ yellow-colored wooden mixing paddles, tinted with different shades of yellow paint. Blended yolks are then graded acording to the desired color on the paddle.

We suggest that you contact Munsell Color Co., Inc., 10 E. Franklin St., Baltimore. This firm can supply a working set of color standards to fit any product.

For a good understanding of colors, you might obtain USDA Miscellaneous Publication 580, entitled "Color Measurement and Its Application to Grading Agricultural Products," published in 1947.

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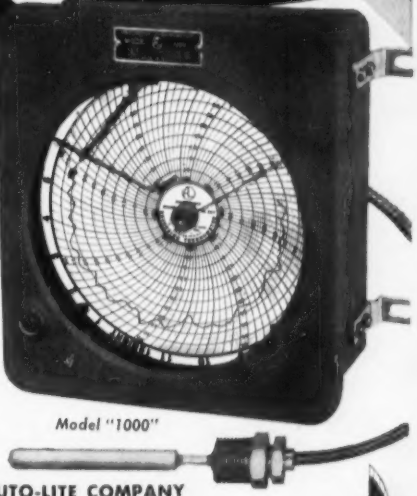

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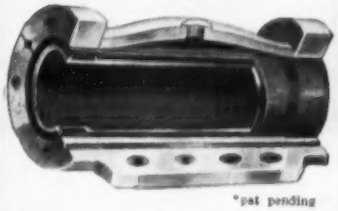


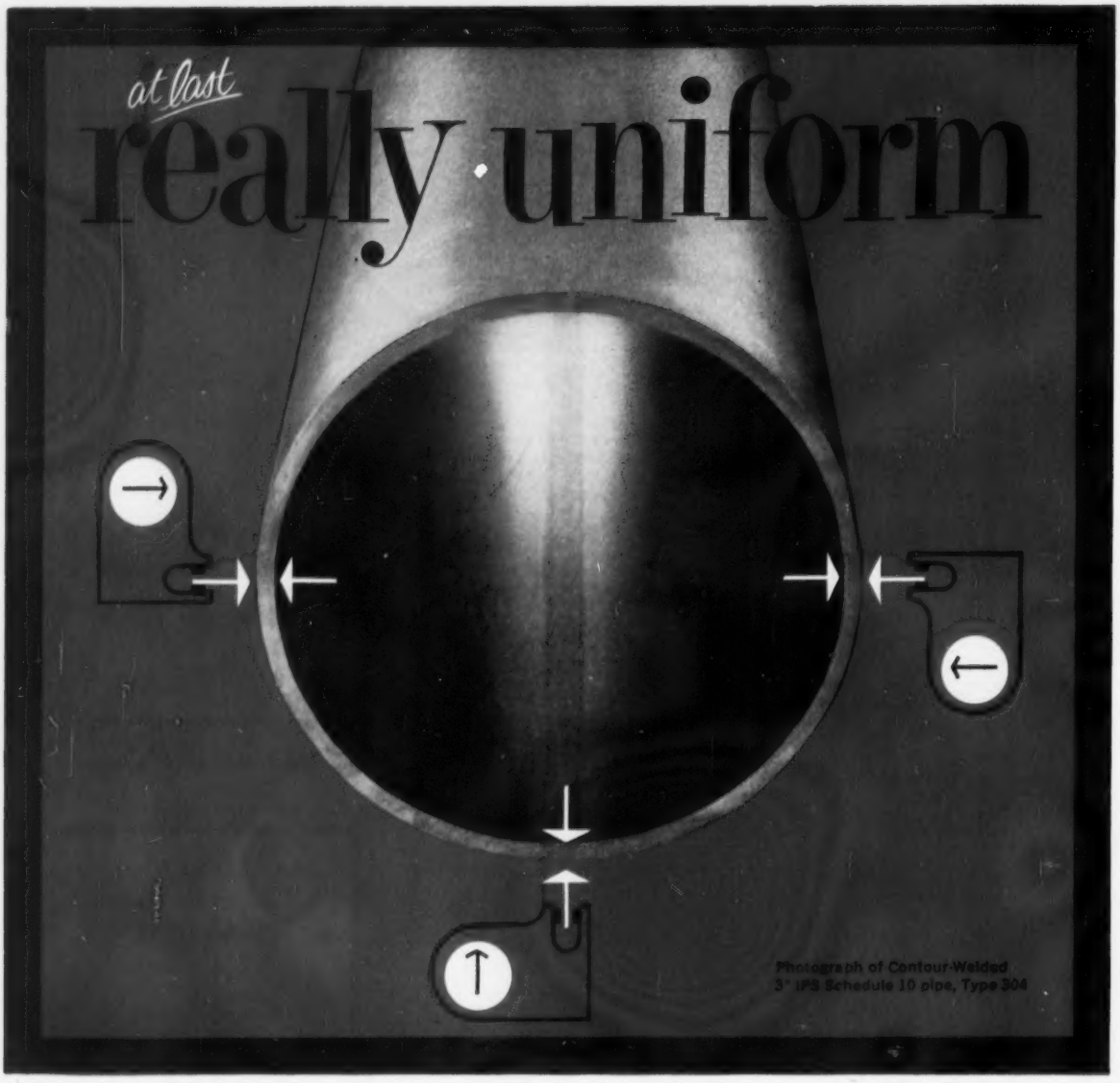
*pat pending

This pneumatic control valve easily handles flour, cereal, cocoa, sugar, wheat, whey, molasses, dog foods, etc. in liquid or dry granular form.

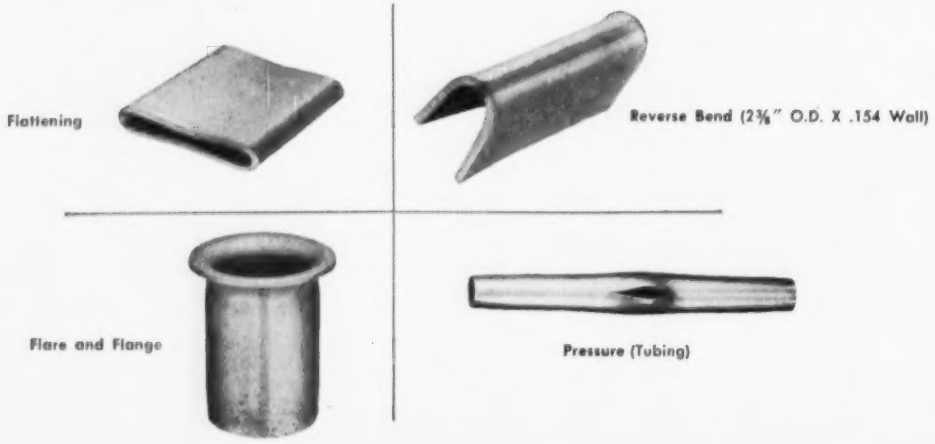
- Full ROUND PORT eliminates plugging of line—unobstructed flow
- No pockets for Food Decay
- Only one wearing part
  Blow-out protected
- Action of valve instantaneous
- Controlled automatically from time cycle programer or manually on location

Ask for Bulletin N-2 for complete details

RED JACKET COMPANY, INC.
500 BELL AVENUE, CARNEGIE, PA.



CONTOUR-WELD PIPE...BEST BY ANY TEST YOU CAN NAME



← For more data, circle this page number on card at back

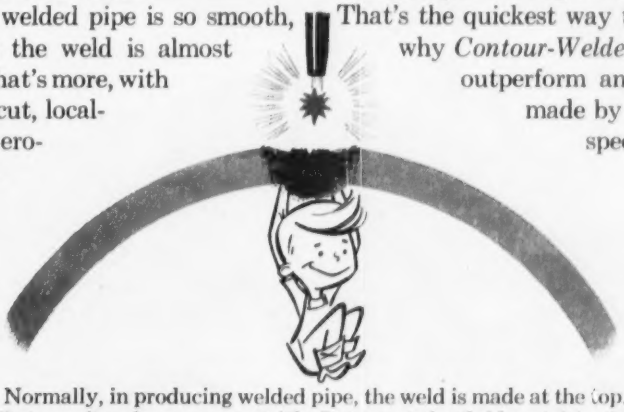
stainless pipe

...by Trent's new Contour-Weld process

Trent's new, patented *Contour-Welded* stainless pipe and tubing gives you all the uniformity of wall thickness you'd expect in welded pipe and tubing – plus equal uniformity in the weld zone itself.

This new-type welded pipe is so smooth, so uniform, that the weld is almost imperceptible. What's more, with no bead or undercut, localized corrosion or erosion is eliminated . . . physical properties are better than those of any other pipe, welded or not.

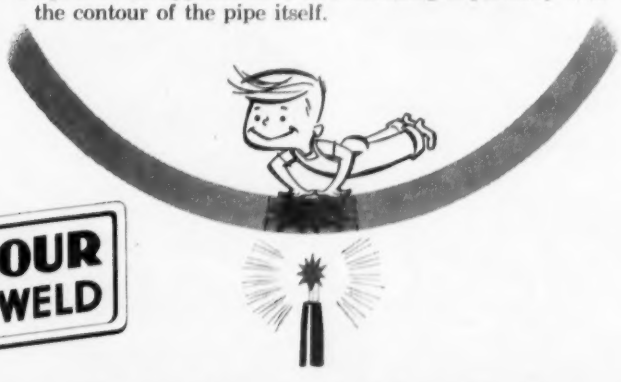
But try Trent's new *Contour-Welded* pipe or tubing yourself. As a matter of fact, ask for a sample – and give it any test you like. That's the quickest way to see for yourself why *Contour-Welded* pipe and tubing outperform any other. And it's made by Trent – tube mill specialists.



Normally, in producing welded pipe, the weld is made at the top. But gravity plays a nasty trick. It tugs at the fluid metal in the weld zone, pulling it down toward the middle of the pipe. The result, particularly in the heavier gages, is a perceptible bulge where it hurts the most—right on the I.D. surface. If you try to get rid of the bulge—at fair cost—the metal is undercut—and corrosion and erosion start there.

Why Trent's Exclusive *Contour-Weld* Process Means Smoother Welds . . .

But Trent put a stop to that—simply by going into partnership with gravity. With their exclusive *Contour-Welding* process, they weld at the bottom—and gravity works for them. For then, the bulge is in the opposite direction—blending in perfectly with the contour of the pipe itself.



CONTOUR TRENTWELD

Stainless and High Alloy Welded Tubing

TRENT TUBE COMPANY, GENERAL SALES OFFICES, EAST TROY, WISCONSIN (Subsidiary of Crucible Steel Company of America)

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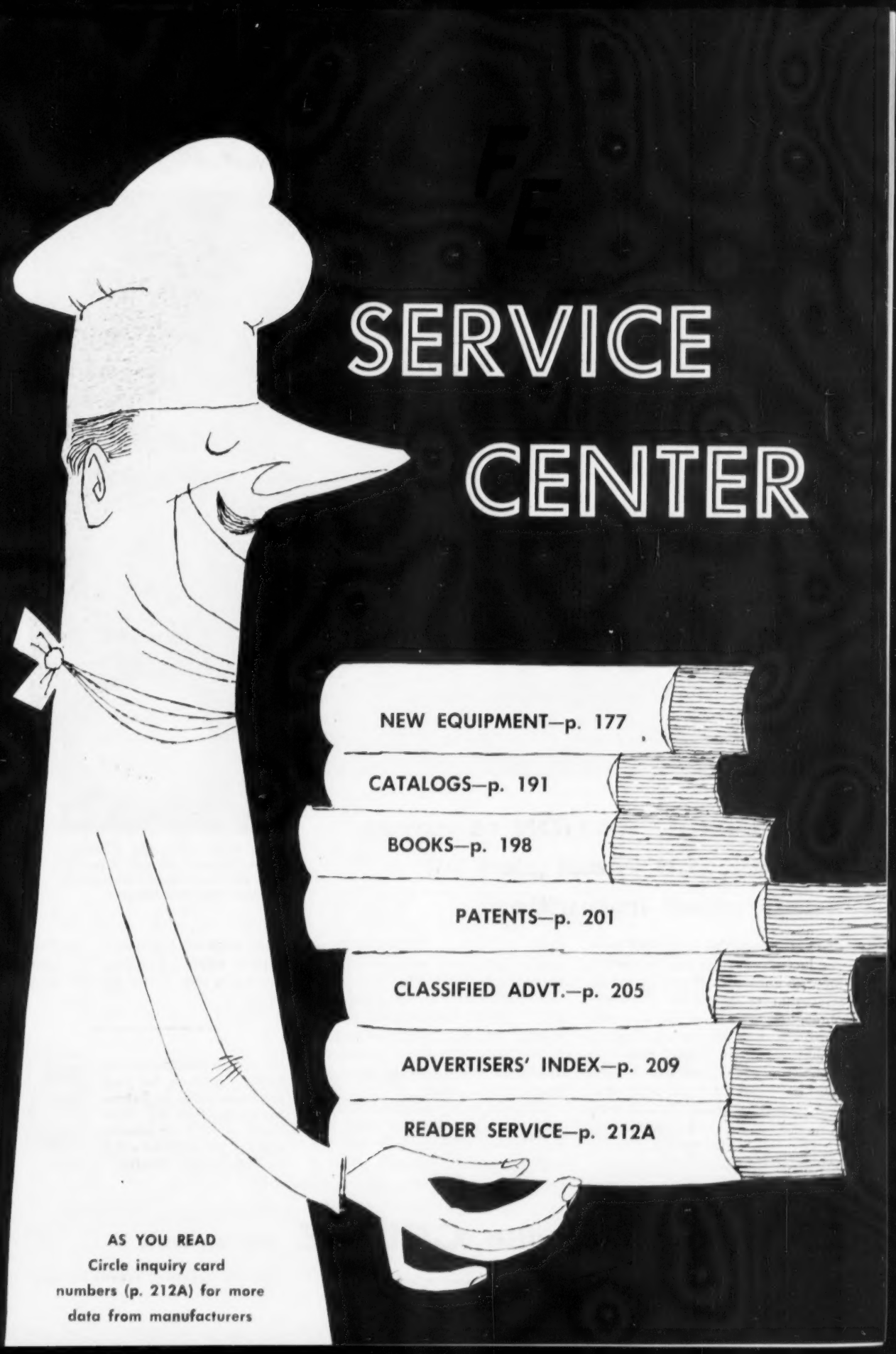
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data from manufacturers

If your customers gave your products a "bug count"

These Petrie dishes give a graphic demonstration of the high degree of spore and yeast removal that can be achieved with Celite filtration.

CELITE FILTRATION removes spores and yeast plus all suspended impurities

How can you be sure that your products are at their very best when they go into the laboratory of an important customer or prospect? One good way is to use the most thorough method of clarification available. That's Celite* diatomite filtration which gives you a filter cake hundreds of times finer than the finest wire mesh. It not only removes suspended impurities, but polishes filtrates to a brilliant sparkling clarity.

Celite is as economical as it is thorough. Only small amounts are required to keep the filter cake open. Fastest flow rates are obtained from the 2,500,000 filter channels in every square inch. And Celite can be used with almost any filter. Automatic operation eliminates the need for costly skilled labor.

Celite is being used successfully today for filtering sugar, beer, syrups, jellies, cooking oils and fats and many other products which at some stage are in a liquid state. Perhaps it offers advantages for your processes too. Write for full facts today.

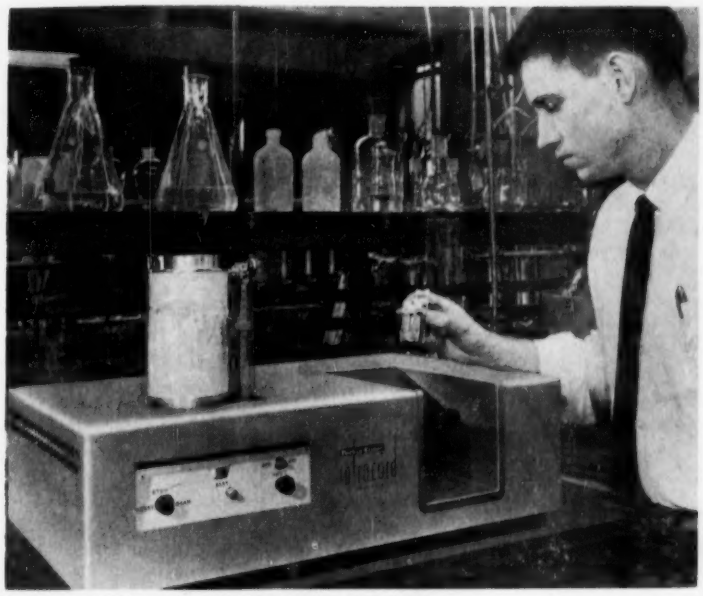
For further information on Celite filtration for your products write to Johns-Manville, Box 14, New York 16, N. Y. In Canada, address 565 Lakeshore Rd. E., Port Credit, Ontario.

*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products

Johns-Manville CELITE FILTER AIDS

CUT OUT AND FILE

NEW EQUIPMENT & SUPPLIES



EASILY OPERATED SPECTROPHOTOMETER enables rapid quality control through infra-red analysis. Self-contained instrument, operating on 120v a.c., provides a permanent record of analysis on 8½x11 in. paper.

RECORDER DRUM, which synchronizes with any wavelength position, demounts for fast paper interchange.

Infra-Red Spectrophotometer Speeds Quality Control

Lower cost and ease of operation of a new infra-red spectrophotometer promise wider application of this versatile analytical tool in quality control and research.

A double-beam instrument (Infracord), it is designed for fast purity checks on raw materials, and precise qualitative and quantitative analyses of complex organic systems.

Operation consists only of putting a piece of chart paper on a demountable drum, inserting the sample, and pushing the start button. Other controls include a start/stop switch, a 100% transmittance adjusting knob, and a manual slit control for differential analysis.

The unattended unit produces a permanent record of the analysis on 8½x11 in. paper in 15 min. Instrument scans a spectral range of 2.5-15.0 microns. Resolution is 0.05 micron at 10 microns, wavelength accuracy is 0.03 micron throughout the rocksalt region, reproducibility exceeds 0.01 micron, and quantitative accuracy is 1%.

Unit incorporates an efficient light-gathering monochromator, and a new radiation source designed for high stability and long life. Provision is also made for canceling the atmospheric background and minimizing stray light.

The recording drum, which is directly coupled to a wavelength cam, positions itself automatically at the starting point. Instrument stops at the 15.0-micron point and can be turned back manually to starting position, or to any other wavelength of interest.

Self-contained unit is 27½x17x8½ in., weighs 120 lb., and uses a 120-v., 60-cycle power source.—*Perkin-Elmer Corp., Norwalk, Conn.*

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Food Equipment Guarded By Sanitary Plastic Liner

A glass-fabric-reinforced polyester, this white lining laminate is seen boosting sanitation in a variety of food-handling and storage equipment. Typical applications include lining of bins, tanks, freezers, freight cars, and trucks.

Called Conoglas, it is a non-toxic, flexible material that resists wear, staining, and corrosion by mineral acids, vegetable oils, brine, and weak alkalis. Furthermore, it does not support mold growth and may be washed with disinfecting chemicals.

Available in rolls up to 150 ft. long or as cut-to-size sheets, lining is 0.018 in. thick and weighs 0.15 lb. per sq.

ft. Standard width is 36 in. Material generally is installed by means of contact or epoxy adhesives, or mastics.—*Continental Can Co., Conolite Div., 205 W. 14th St., Wilmington, Del.*

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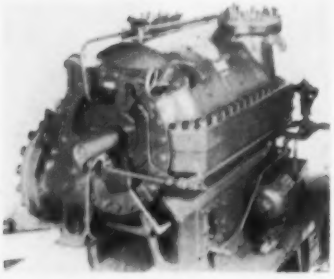

Centrifugal Compressor Has Simpler Design

Compact and simplified, new multi-speed centrifugal compressors reportedly can now be used in applications where previously only reciprocating types could be employed.

Available in capacities from 100 to 4,000 tons, they offer maintenance economy through use of a minimum number of parts. Furthermore, shaft seals can be replaced without removing refrigerant from the system.—*York Corp., York, Pa.*

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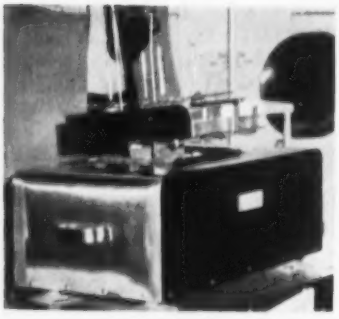

Efficient Shaker Speeds Butterfat Test

This automatic shaker for Babcock butterfat-test bottles is designed for elliptical motion, which is required for proper mixing of samples.

Test-bottle trays are quickly clamped into its stainless holder, and total shaking time required is about 2 min. Base of the unit (Fond Du Lac) has suction cups, thus machine needs no installation.

Shaker is 13⅞ in. wide, 24¾ in. long, and 13¼ in. from bottom to top of tray holder at low side. Unit employs ⅓-hp. motor (115 v., 60 cycle, single phase), and weighs 70 lb. A stainless hood encloses the entire mechanism.—*Damrow Brothers Co., Fond Du Lac, Wis.*

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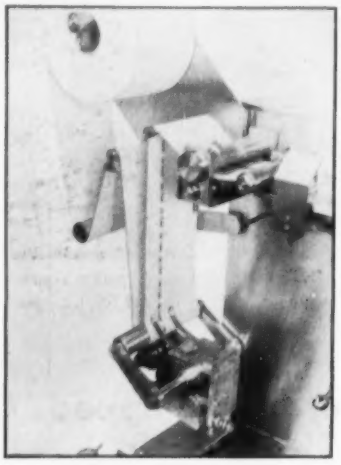

Attachment Prints Flavors On Ice-Cream Wraps

Designed for easy attachment to an ice-cream brick machine, this compact unit imprints flavors and brand names on the wraps during packaging.

Known as "Rolaprinter Model 992," device imprints a wrap as it is fed from a roll just prior to being cut and wrapped around a brick. Unit uses rubber type and quick-drying liquid inks of any color. Type may be changed in a few minutes whenever a new imprint legend is desired.

Fully automatic, unit requires no attention except for type changes, and easy end-of-day cleanup. Ink supply is adequate for a day or more of continuous imprinting.—*Adolph Gottscho, Inc., Hillside, N. J.*

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Want More Information?

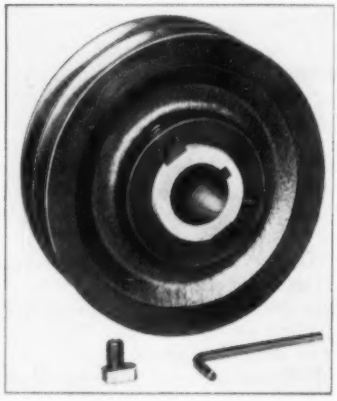
It's free—and easy to get. Simply note here the items on which you want more details, then circle each key number (there's one given at the bottom of each item) on the handy Reader Service Postcard—back of book. Then sign at the bottom and mail. For your convenience, too, items in this department are listed and keyed in the Reader Service Section.

Liquid Coolers Employ Special Valve Design

A new line of flooded-type liquid coolers offers special multi-pass design for efficient handling of viscous fluids and slurries. Capacities range from 5-100 hp.

Unit (Packaged Liquid Coolers) includes a complete refrigeration cycle—compressor, motor and starter, refrigerant controls, liquid cooler, condenser, piping, wiring and insulation.—*Doyle & Roth Mfg. Co., 136-50 24th St., Brooklyn, N. Y.*

Circle 178D on Reader Service Card



2-Groove Sheave Allows Easier Speed Adjustment

This new two-groove sheave is designed for quick and easy speed adjustment of maker's V-belt drive (Texrope) in A and B sections. The line also includes a one-groove model.

For low-power applications, these units (Magi-Keys) offer increased

maximum design horsepower. For example, this sheave will now handle about three times the horsepower of former two-groove models. Keys transmit all rotational torque, thus set screws no longer bite into threads.

The flexibly joined set screw and key give a positive lock between movable disks and stationary hub. Key and set screw remain joined and in place, thus cannot drop out during adjustment or move out of alignment.—*Allis-Chalmers Mfg. Co., Milwaukee.*

Circle 178E on Reader Service Card

New TV System Permits Two-Way Control

Employing a single coaxial cable, a new closed-circuit TV system offers two-way pictures, two-way communication, and remote control throughout a plant. Formerly, a separate cable was needed to carry each of these functions.

Called Industrial Television Control System, it virtually permits use of any closed-circuit TV cameras, which can also be mixed in the same system and plugged in at any point. Furthermore, there are an unlimited number of outputs to receivers. System also integrates supervisory control equipment, which can select cameras remotely and adjust them to show the desired picture.—*Jerrold Electronics Corp., 23rd & Chestnut Sts., Philadelphia.*

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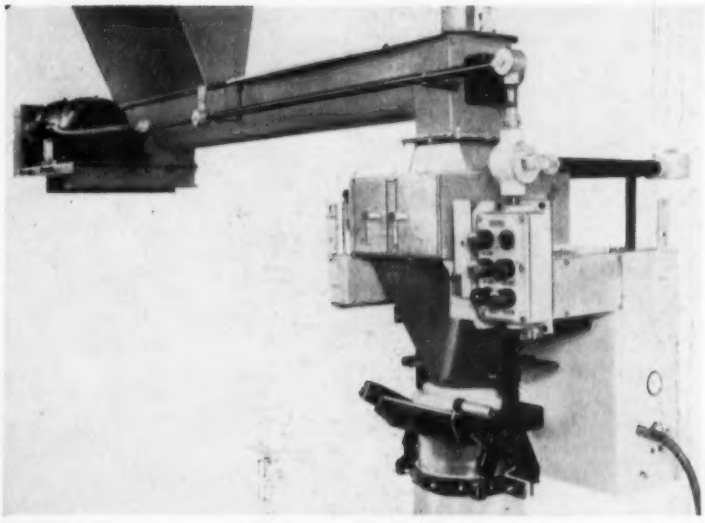

Automatic Gross Weigher Handles 'Difficult' Items

Materials that do not flow freely, such as powdered sugar, milk, and starch, may be accurately bagged by this new automatic gross weigher. In addition, it handles free-flowing items.

Unit (E-52) fills 25-lb. and 100-lb. bags at 5-6 per min. Accuracy averages 1-2 oz. Automatic devices on the scale include pushbutton control, automatic feed and bin-level switches, and choice of power feed mechanisms. Scale feeds directly into a bag suspended from a weigh beam, rather than through a weigh hopper. This keeps material continuously in motion to eliminate any build-up and erratic discharge of material.

To start a weighing cycle, operator presses a button that automatically opens an air-operated radial gate at scale's inlet. If power feeders are used, feeder motors start simultaneously. As pre-set weight is approached, the beam moves toward balance to close the gate and stop the feeding. The bag, which is held securely on the spout, is then released.

Automatic feeding can be included by mounting a limit switch on the bag holder. Feeding starts when bag flaps are closed, since limit switch and gate switch are in series.

Excluding feed arrangements, scale requires only 3 ft. of headroom. Equipment can also be supplied as a portable unit to serve scattered bins in a gravity-feed operation.—*Richardson Scale Co., Van Houten Ave., Clifton, N. J.*

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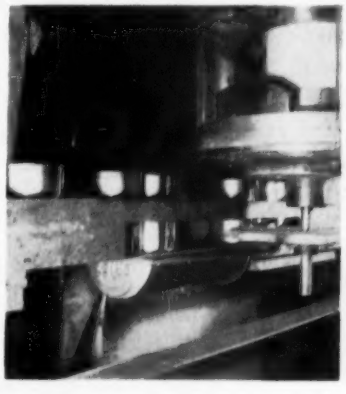

New Salt Dispenser Offers Canning-Line Flexibility

With use of this dispenser, bulk salting in canning plants can now be accomplished before cans reach the hand-pack filling table. Furthermore, unit (Precision Dispenser) also handles salt mixtures of monosodium glutamate and calcium sulphate.

Dispenser has a 50-lb.-capacity hopper. It operates at speeds up to 180 cans per min. with an accuracy of ±5%. This performance is attributed to a large-diameter "live cone" orifice, and heating elements

Only this new Bliss Duplex Slitter can save you so much time

You can slash hours off every cutter regrind with this new slitter. That's because the first table retracts almost two feet—lets you get right in at the cutters. Simply attach the motor-driven grinder, then sharpen the cutters in place.

This accessibility also simplifies set-ups and changeovers. And making things even easier is the exclusive design of the bearing housings—they're quickly removed, easily replaced. The side and back gages, too, are easy to reach and adjust, speeding up the entire process.

In short, Bliss' new duplex slitter cuts the heart out of downtime. It saves hours every time you sharpen or set cutters. Whether you slit body blanks or trim and square tinplate, you'll like the accuracy and speed of this most modern of slitters. For complete information write for a copy of our new slitter catalog.

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in both the base plate and dispensing plate, which keep the salt dry and free-flowing.

Unit further employs a magnetic insert beneath the line to hold cans in position for the salt charge. Thus, the salting line can be situated in any convenient place and cans move along smoothly without bunching up.

A Plexiglas shield surrounding the dispenser protects it from moisture and dirt. When not in use, entire unit can be covered with a polyethylene bag that ties underneath.—*Frank Hamachek Machine Co., Kewaunee, Wis.*

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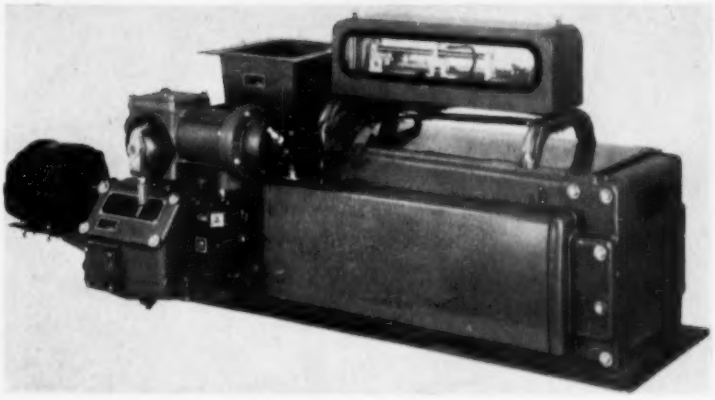

Precise Weigh-Feeders Have 3-3,000 Lb./Min. Range

Controlled by a 3-15 psi. air signal, a new line of gravimetric feeders affords high sensitivity and quick response in continuous blending or automatic batching of dry, free-flowing materials. The pneumatic signal may be set manually or applied automatically from an external power source.

Two models (Pneumatic Scale Feeders), employ 9- and 18-in. belts respectively. They maintain a minute-to-minute accuracy of ±1% in covering a 3-3,000 lb. per min. feed range. This performance is attributed to constant weigh-belt speed, low inertia of the weighing platform, and minimum lag between detection of unbalance and correction.

The scale is a force-balance system which develops a signal directly proportional to the feed rate. Air pressure is applied to a pneumatic controller, which compares "measured" pressure against "set" pressure representing a desired feed rate.

This controller detects any deviation and corrects it by adjusting pressure output to a pneumatic positioner regulating the opening of a vertical gate in the feed-control section.—*Wallace & Tiernan, Inc., 25 Main St., Belleville 9, N. Y.*

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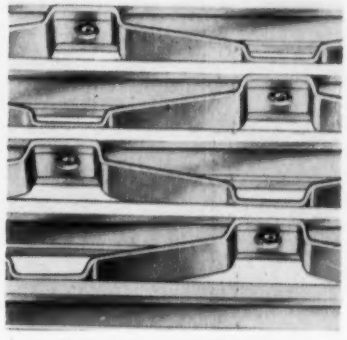


Floor Grating Combines Strength, Light Weight

Based on a design that places most material where stress is greatest, this open-type steel floor grating offers 22% greater load-carrying capacity with 14% less weight.

Unit (Gold Nugget) is recommended for all types of heavy-duty platforms, such as those in power houses, loading docks, and filtration rooms.

Grating employs I-beams (as primary load bars) to which secondary bars are projection-welded for strength and rigidity. At a connection joint, three bars are welded with a ⅜-in.-dia. nugget. Thus, all bars are designed to function as load-carrying members.

This arrangement minimizes deflection and provides a diamond-shaped "anti-skid" surface.—*Globe Co., 4000 S. Princeton Ave., Chicago.*

Circle 181A on Reader Service Card

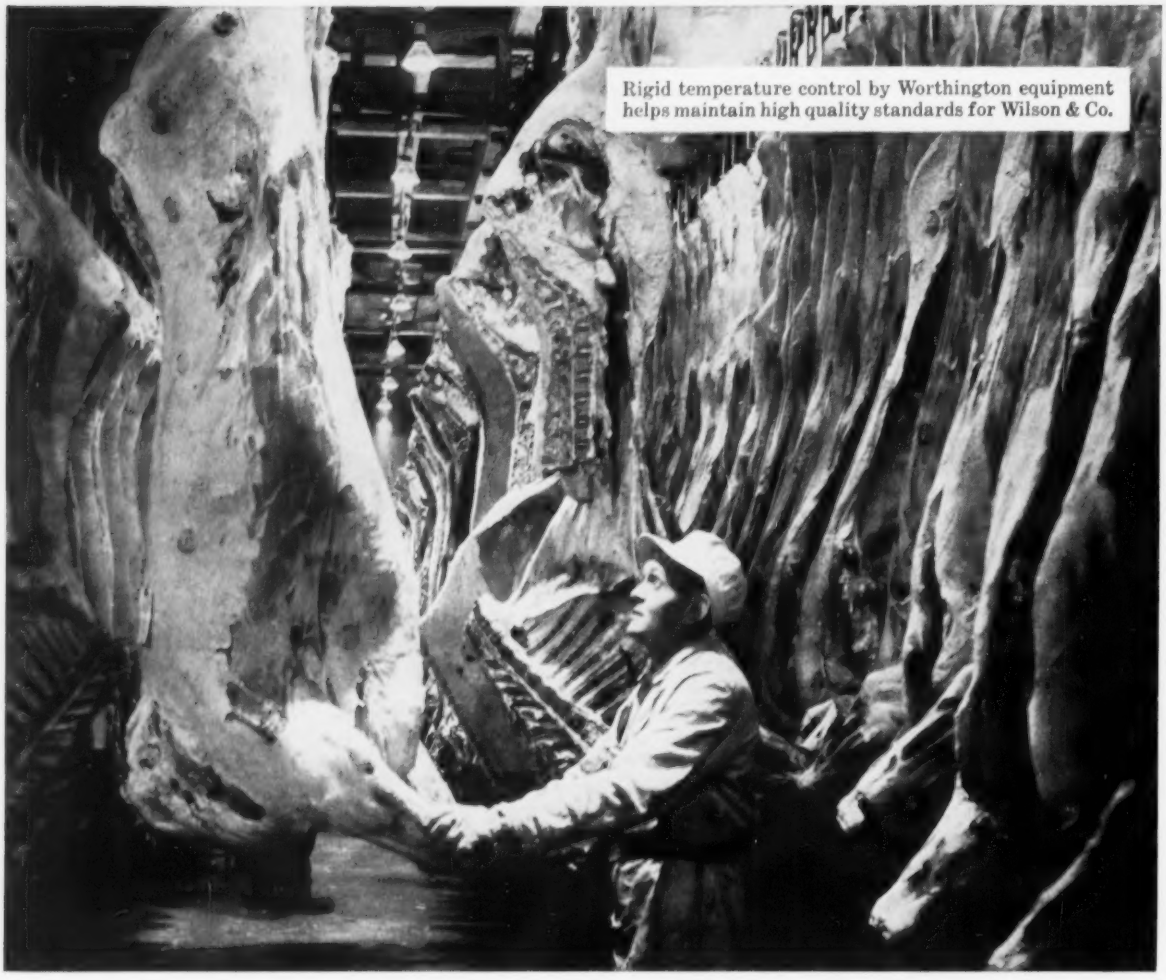
COE Truck Line Designed For Maximum Payload

Lightweight construction, shorter bumper-to-back-of-cab dimensions, and improved tilting-cab accessibility are offered in a new line of cab-over-engine trucks.

Carrying gross combination weight ratings of 55,000-76,800 lb., units are available in two series: 4- and 6-wheel diesels (DCO-405) and in lightweight models (VC-405-L) powered by maker's new V-8 gasoline engines, or by diesels. Nine basic designs provide a choice of 11 diesel or gasoline engines.

Servicing time is cut by design of the new cab, which can be tilted 55 deg. in less than 1 min. Chassis weight is reduced by use of aluminum in frames, cross members, brackets, and wheels. Cab lengths start at 50 in., with larger models having 62-, 72-, and 80-in. dimensions.

Cab construction also provides 1,672 sq. in. of windshield area and extended wing-type, drop-door windows for maximum visibility. A new steering wheel angle further contributes to safety and driver comfort



Rigid temperature control by Worthington equipment helps maintain high quality standards for Wilson & Co.

Wilson & Co. achieves constant cool temperatures with Worthington Y Ammonia compressor

At the Wilson & Co. packing house in Kansas City, Worthington refrigeration equipment plays an important part in the expert processing of well over 1,000 cattle and hogs per day.

Wilson stresses heavy duty dependability in their refrigeration requirements. That's where the rugged design of the Worthington Y Compressor pays off. It's designed for continuous trouble-free operation so necessary in meat processing plants.

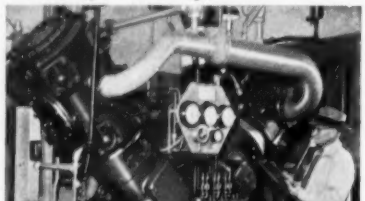
A Worthington Y Ammonia Compressor, similar to the 155 ton unit shown here, can give you extra dividends too, by saving on costly foundations and valuable floor space. The vertical arrangement saves space, and a flange mounted motor may be used, thus eliminating the need for a separate motor foundation.

An outstanding feature of the Y Compressor is the Worthington Feather* Valve. It is the lightest, simplest, and most efficient valve ever developed for refrigeration compressor work. Valve strips open and close with a gentle rolling motion—there is no destructive impact. Valve action is extremely sharp with a perfect responsiveness to flow.

Three heavy duty double-roller main bearings, supported by the main frame, assure you of permanent alignment and overall rigidity. There are no motor alignment problems.

All materials which conform to Worthington high standards are used in construction of the Y Compressor. You can be sure the Worthington Y Compressor will serve you dependably and efficiently.

For details, write: Worthington Corporation, Air Conditioning and Refrigeration Division, Section A.5.62-FE. Harrison, New Jersey.



Your refrigeration problems can best be solved with a Worthington Y Ammonia Compressor. Available in single or two stage. Capacities: 60 to 460 tons.

*Reg. U. S. Pat. Off.

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CLIMATE ENGINEERS TO INDUSTRY, BUSINESS AND THE HOME

through better leverage and control.

Power plants include 8 diesels with ratings to 335 hp., and 3 gasoline engines of 401, 461, and 549 cu. in.-displacements, and horsepower ratings of 206, 226, and 257, respectively.—*International Harvester Co., 180 N. Michigan Ave., Chicago.*

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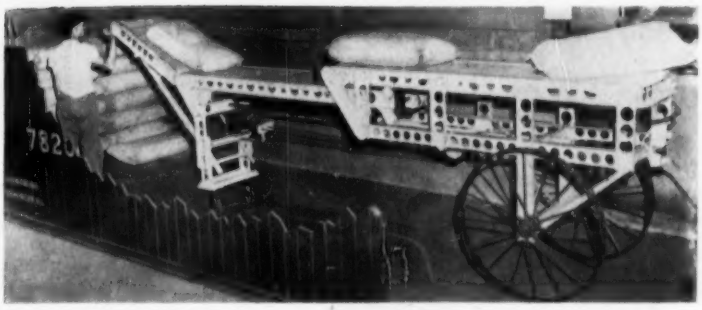

Efficient Unit Eases and Speeds Box-Car Loading

Weighing 900 lb., this aluminum unit is designed to eliminate trucking, carrying, and lifting of sacks in loading a box car. Thus, one operator does the job in 59 min.

Sacks feed into the device (Box Car Loader) from a chute (top right), and are turned by the conveyor belt. A motor ratio of 16 to 105 rpm. gives a belt speed of about 90 fpm.

But this speed can be varied by changing sprockets. Automatic reels are used for electric cables to gear motor at front of loader, and moving parts work on self-aligning ball bearings.—*Ottumwa Box Car Loader Co., Ottumwa, Iowa.*

Circle 183B on Reader Service Card

Heater-Stirrer Unit Speeds Mixing

This combination 700-w. heater and magnetic stirrer is designed to cut the time of routine stirring, mixing, and dissolving operations in research and quality control.

Known as Thermix, it offers gentle agitation without splash, and elimination of propeller shaft. To prevent overheating of stirrer motor, it is insulated from its ceramic-supported hot plate by a composite heat barrier. Moreover, a Fiberglas extension keeps heat from traveling along motor shaft, thus temperature of the stainless case never exceeds 120F. To overcome magnetic interference and corrosion, copper-jacketed heating elements are cast directly into the aluminum hot plate, which also speeds heat transfer to beakers.

Hot plate and stirrer can operate independently or simultaneously. Unit uses a continuously variable bimetallic thermostat for top-plate control. This provides rapid warmup, yet eliminates excessive temperature overshoot.—*Fisher Scientific, 345 Fisher Bldg., Pittsburgh.*

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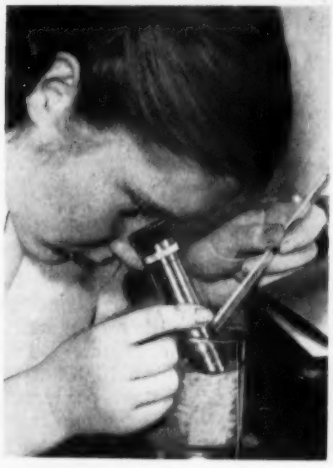

Versatile Refractometer Is Highly Accurate

This low-cost instrument is designed for precise, rapid, and easy determination of total soluble solids in juices, jams, jellies, and syrups. Two models are available in Brix ranges 0-47% and 45-75% soluble solids.

Known as Combination Hand and Dipping Refractometer, it employs a special optical system that transmits a sharp division line onto a large 0.5% graduated scale in the focusable eyepiece. Metal parts are corrosion resistant and easily cleaned under running water.

A water-tight prism assembly permits immersion readings and prevents seepage into the internal system. A thermometer ranging 10-40 C. is recessed in the prism mounting. It increases accuracy by measuring actual temperature of sample and instrument, rather than that of surrounding air. Unit is supplied with a leather carrying case.—*American Optical Co., Instrument Div., Buffalo, N. Y.*

Circle 183C on Reader Service Card

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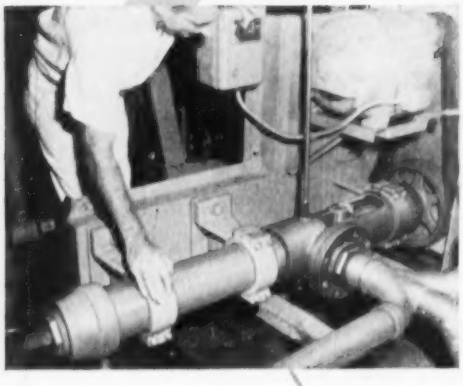
MOYNO® PUMP

BOOSTS PRODUCTION 700%

at Stephen F. Whitman and Son, Inc.

...pumps 190°F. caramel and whole raisins



The Moyno "progressing cavity" pumping principle has enabled Stephen F. Whitman and Son, Inc. to increase production seven times over the former batch type process used in one department. The material pumped is 190°F caramel with whole raisins at viscosities from 70,000 to 135,000 C.P. This particular installation pumps 30 gallons per minute at 350 RPM driven by a 10 H.P. motor. This is but one example of the savings made possible by the 41 Moyno Pumps in use at Stephen F. Whitman and Son, Inc.

Moyno is the only pump that will handle many difficult materials such as abrasives, pastes, slurries, chemicals, foods, suspended solids, etc., without foaming, aerating, crushing or excessive pump wear.

Examine your processing methods. No doubt there are several places where Moyno Pumps can drastically cut costs. Ask us, we'll give you a prompt answer. Send us an outline of your problem today! Write for Bulletin 30-FE.

R&M

ROBBINS & MYERS, INC.

SPRINGFIELD, OHIO | BRANTFORD, ONTARIO

Motors | Fans | Hoists | Moyno® Pumps | Propellair® (Industrial) Fans

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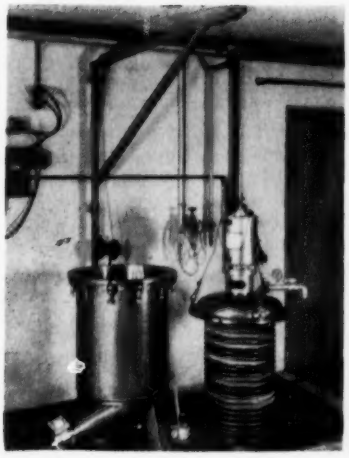


Efficient Filter Is Cleaned Without Dismantling

Time and labor savings are cited for a new filter that can be automatically cleaned in about 1 min. without opening the press. With downtime minimized, filter surfaces of 100 sq. ft. or more offer high production efficiency.

Available in stainless steel, unit (Funda) consists of a pressure vessel and spaced circular filter elements attached to a perforated rotatable shaft. Filtrate travels through the elements, then downwardly through the hollow shaft. Filtering medium may be a stainless or cloth-covered screen, and any type of filter aid can be used as pre-coat.

After filtration, vessel is emptied and cleaning is accomplished by rotating the motorized shaft. As cake is flung off by centrifugal force, a stream of wash water is directed through the shaft and onto the elements.—*AG. fur Chemie-Apparate-bau, Mannedorf-Zurich, Switzerland.*

Circle 185A on Reader Service Card

30-Amp. Safety Switch Takes 50% Less Space

Compact design of a new 30-amp., 600-v. safety switch has halved the installation space formerly required.

Measuring 7⅛x9⅛x5⅛ in., unit (Style HCI) is available in heavy- and normal-duty models, and in all NEMA Type 12 enclosures. A front-operated handle on the heavy-duty model facilitates close ganging. Their double-break pole units can be individually replaced, and front fusing on both models allows quick access.

Equipment has quick-make, quick-break contacts that cannot be teased in or out. Switch handle locks off or on, and a special line shield on heavy-duty model guards against accidental contact with live parts.—*General Electric Co., Circuit Protective Devices Dept., Plainville, Conn.*

Circle 185B on Reader Service Card

Versatile Solenoid Valve Has Separate Controls

This unit affords independent controls for manual opening, adjustment of flow, and opening and closing speeds.

Known as Type HV, unit can be mounted on piping running at any angle. It is designed primarily for filling operations and hydraulic systems, but can be used in a variety of general service applications. Valve is available in all standard sizes from ¼-2 in. Maximum rating is 300 psi.—*J. D. Gould Co., 4707 Massachusetts Ave., Indianapolis 18.*

Circle 185C on Reader Service Card

INGREDIENTS

New Vegetable Coloring Has Wide Application

In the yellow-to-orange range, this new agent offers uniform coloring of a variety of items—baked goods, candies, dairy products, oleomargarine, ready-mix powers, and processed meats.

Extracted from annatto seed, material (Anattene) is available as water and oil-soluble types, and in microcrystal, powder, and liquid forms. Thus, its use can eliminate the problems of color separation and streaking due to incompatibility. Furthermore, product is odorless and tasteless when used at recommended concentrations.—*S. B. Penick & Co., Essential Oils Div., 50 Church St., New York City.*

Circle 185D on Reader Service Card

Dry Vitamin E Powder Has High Stability

A new dry form of vitamin E offers the food processor excellent stability and superior ease of handling.

In the form of the acetate, this powder contains 250 I.U. of vitamin E per g. All components of the granule are easily digested, hence vitamin's biological activity is fully available. When incorporated in dry mixes, such as powdered food supplements, material disperses in milk, fruit juices, and water. Potency is maintained even when foods are kept for several days in household refrigerator units.—*Hoffman-LaRoche, Inc., Nutley, N. J.*

Circle 185E on Reader Service Card

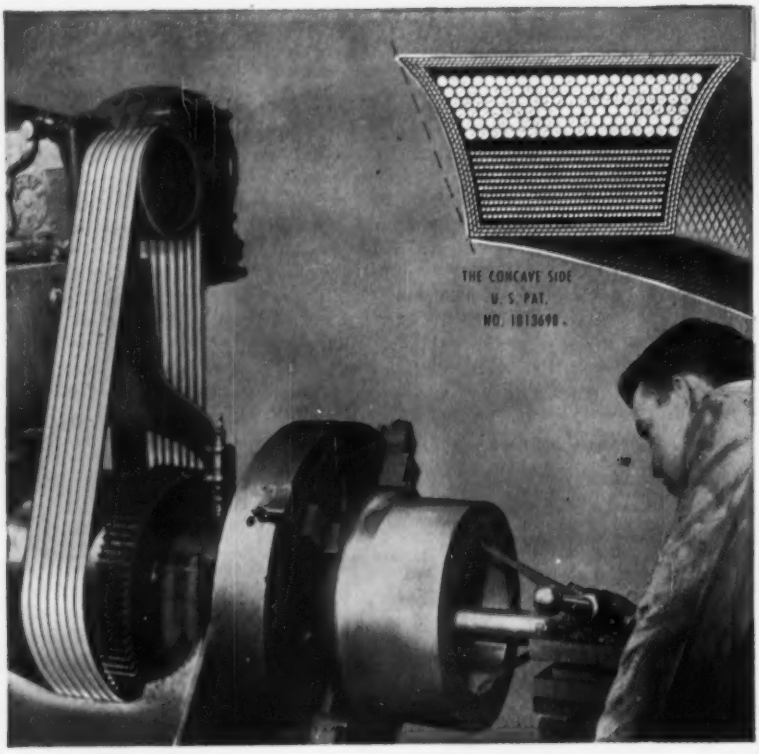
CHEMICALS

Develops Special Resins For Chromatography

A complete series of ion exchange resins, specifically designed for chromatographic analysis, offers optimum particle size for most requirements.

Known as CG Series, resins are available in four grades: Strongly acidic and weakly acidic cation exchangers; and strongly basic and weakly basic anion exchangers. Within each classification, there is a choice of two particle sizes: Type 1, between 100 and 200 mesh (dry); and Type 2, passing 200 mesh (dry).

Type 1, with a larger particle size



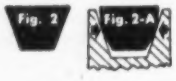
WHY you get more service from V-Belts with concave sides

Each sidewall of a Gates V-belt is concave (Fig. 1) — a precisely engineered curve that makes V-belts last far longer.

HERE'S WHY: on the bend around the sheave, the concave sides of a Gates V-belt fill out and become straight (Fig. 1-A). Thus the belt makes full contact with the sides of the sheave, grips the sheave *evenly*.

This even contact distributes wear uniformly across the sides of the belt. Uniform wear lengthens belt life; keeps costs down.

MAKE THIS SIMPLE TEST



Bend a straight-sided belt (Fig. 2). The sides bulge at the bend causing uneven contact in the sheave groove (Fig. 2-A). Naturally, wear is greater at points indicated by arrows. Result: shorter belt life, increased belt costs.

To cut down-time and V-belt replacement costs, specify belts that grip evenly and wear longer. Specify Gates Vulco Rope — the V-belt with concave sides. The Gates Rubber Co., Denver, Colorado — *World's Largest Maker of V-Belts.*

There are Gates Engineering Offices and Distributor Stocks in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

Gates

IPA 109A

Gates Vulco Rope Drives

Chemicals

that permits reasonably rapid flow rates, separates materials with appreciably different chemical properties by a combination of ion exchange and adsorption. Type 2, with smaller particle size, offers greater surface area for higher rate of reaction. Flow rate over Type 2 resins is somewhat restricted, but materials closely related chemically may be sharply separated.—*Rohm & Haas Co., Resinous Products Div., Washington Sq., Philadelphia.*

Circle 185F on Reader Service Card

Offer Tinning Compound For Food Equipment

Available in powder or stick form, this tinning compound is designed for repairing damaged areas of tinned food-handling equipment.

The stick (AMCO) can be applied quickly and easily by rubbing it over the heated surface. The powder is mixed with water to form a paste, painted over the surface to be repaired, then heated.

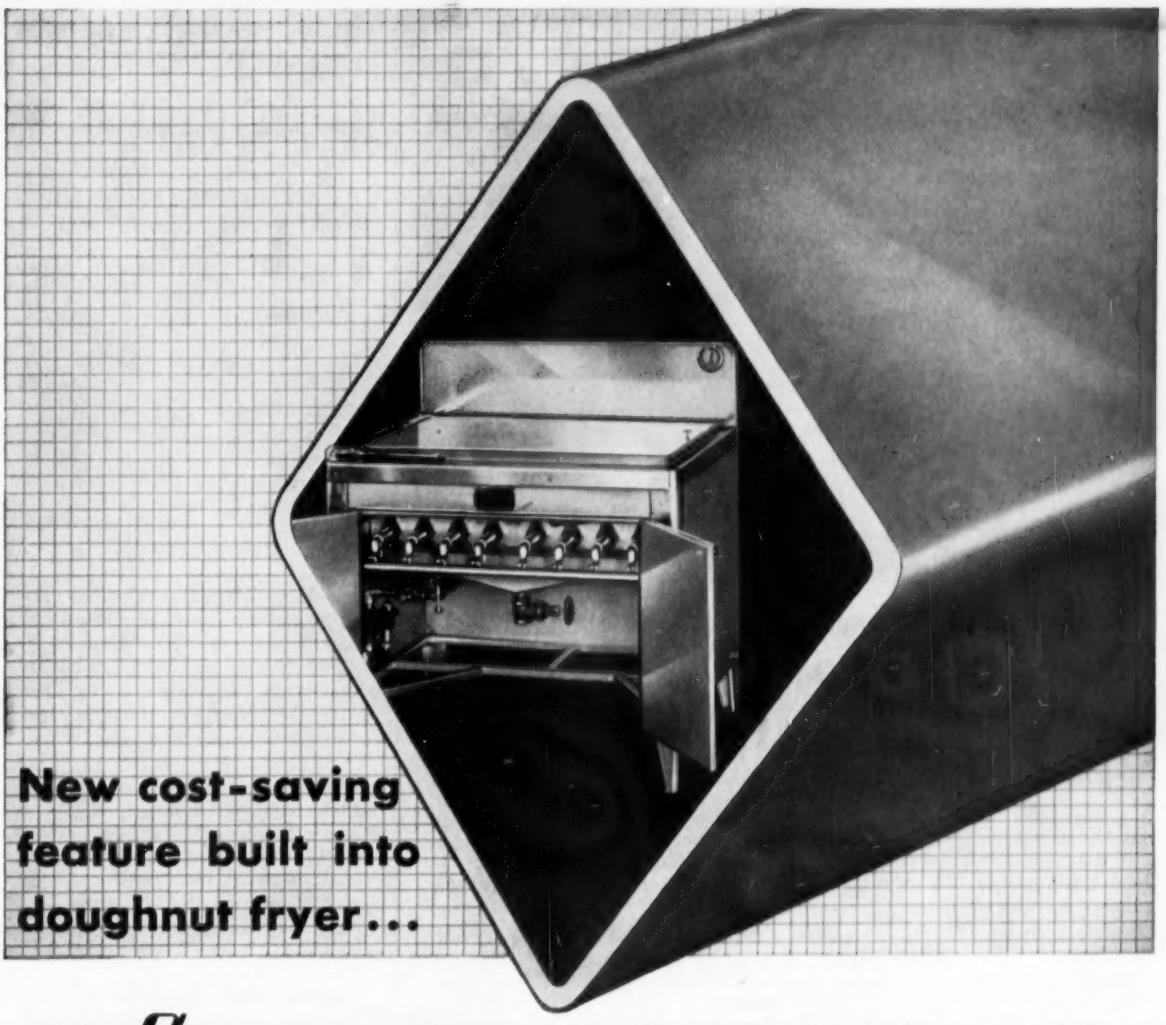
These materials provide a strong and permanent bond of pure tin with base metal and surrounding tin coating.—*American Solder & Flux Co., 19th & Willard Sts., Philadelphia.*

Circle 186A on Reader Service Card

BRIEFS . . .

Salad Mixer employs special agitator for gentle agitation, free of crushing or cutting. Stainless unit handles variety of salads (potato, chicken, sea-food, fruit), creamed cabbage, and cole slaw. Tiltable mixing bowl, with wide-mouth pouring spout, can be hoisted to discharge product to filler hopper. Mixer capacities: 300, 500, 750, and 1,000 lb.—*Grace Machinery Co., 4219 Grove St., Oakland, Calif.* (186B)

Self-Powered Feeders, available in 7 sizes (each with 10:1 range) control dry, free-flowing materials at rates from 5-2,000 lb. per min. Units operate on principle of balanced weights—force produced by item being fed, as it falls onto an impact pan, is balanced by a pre-set counterweight. Automatic shutoff is optionally available.—*Wallace & Tiernan Inc., 25 Main St., Belleville, N. J.* (186C)



New cost-saving feature built into doughnut fryer...

with *Carpenter* Diamond-Shaped Stainless Tubing

• A new feature in this volume doughnut fryer is the use of super sanitary heating tubes made from diamond-shaped Carpenter Stainless Tubing. The diamond shape permits faster, more economical heating because of the greater heating surface in contact with the fat. Doughnut crumbs cannot settle on the tubes, making cleaning easier and preserving the fat longer.

This is just one more example of combining the inherent advantages of stainless—high strength-weight ratio, fine appearance, corrosion and abrasion resistance and super sanitation—with the extra benefits of special shapes of Carpenter Stainless Tubing. Why not investigate the possibilities of designing and building the advantages of Carpenter Stainless Tubing shapes into your products. Call your nearest Carpenter Distributor or Branch Office for consultation and information.

MEMBER

The Carpenter Steel Company, Alloy Tube Division, Union, N. J.

Export Dept.: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

Carpenter

Stainless Tubing & Pipe

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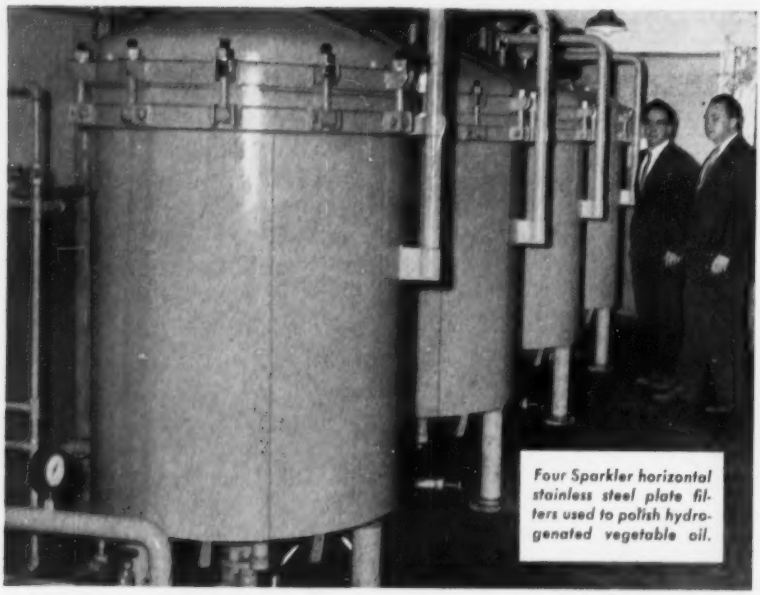


Four Sparkler horizontal stainless steel plate filters used to polish hydrogenated vegetable oil.

Clearer, purer hydrogenated vegetable oil obtained with

Sparkler Filters

SPARKLER horizontal plate FILTERS

At Anderson, Clayton & Co., Foods Division in Sherman, Texas, four Sparkler 33" diameter horizontal stainless steel plate filters are used to polish hydrogenated vegetable oil after it has been deodorized. Several batches of oil are filtered before a change of filter media is needed.

But when changes are required, clean plates are installed quickly in a most resourceful manner. A hoist simply lifts the filter plate cartridge through an opening in the floor above, a clean cartridge is lowered into the filter and the filter is back in operation in a matter of minutes.

Sparkler all stainless steel filters used in experimental laboratories.

This installation also employs two Sparkler all stainless steel filters, one to remove bleaching clay and the other to remove minute nickel catalysts from experimental batches of hydrogenated oil. This difficult separation of the nickel catalyst is accomplished through the use of Filtercel aid in the Sparkler filter.

Sparkler manufactures stainless steel filters in capacities up to 10,000 gallons per hour with completely accessible, easy to clean surfaces conforming to standard sanitary requirements in the food field. Special filters are engineered for special requirements. On your next food filtration application, consult with Sparkler.

Send your requirements to Mr. Eric Anderson for personal service.

Service Representatives in principal cities

SPARKLER MANUFACTURING CO. MUNDELEIN, ILL.

Sparkler International Ltd. with plants in Canada, Holland, Italy and Australia. Filtration engineering and manufacturing exclusively for over 30 years.

Briefs (Cont'd) . . .

New Punch Press produces 7,500 caps per hr. from reels of printed aluminum foil down to 0.04-mm. gage. Closures will fit any round container requiring up to a 6-in. blank diameter. Lids are delivered by chute to a capper, and flow is photocell-controlled.—*Fords (Finsbury) Ltd., Bedford, England.* (188A)

Gas Chromatograph provides continuous sampling of any gaseous stream. Sample is automatically passed through a packed absorbant column that fractionates mixture, then registers percent of each component on a graph.—*Beckman Instruments, Inc., 2500 Fullerton Rd., Fullerton, Calif.* (188B)

Hamburger Molder extrudes meat in blocks ranging from ½-1½ lb. to cut preparation time. Capacity is 40-80 blocks per min., which are then ready for packaging.—*Needham Mfg. Co., Needham Heights, Mass.* (188C)

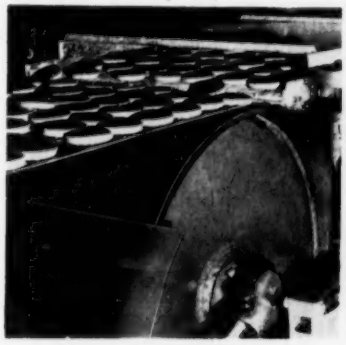
High-Temp Lubricant resist oxidation, sludging, and breakdown in severe service. Typical applications: Motor ring bearings, multi-plate friction clutches, and oven-conveyor chains.—*Keystone Lubricating Co., 3100 N. 21st St., Philadelphia.* (188D)

Sanitary Meat Tenderizer employs stainless, vari-speed conveyor to carry beef cuts through dip tank. Portable unit has 16-in. dipping width and blower that removes excess liquid.—*J. W. Greer Co., Wilmington, Mass.* (188E)

Sausage-Cutter Knife, with scimitar-shaped edge, boosts production by safely handling sliced frozen meats and whole chunks at higher machine speeds. Unit (resembling an inverted "J") hooks over knife shaft and is tightened to it by centrifugal force. Adjustable boss maintains required knife-to-bowl clearance as repeated sharpenings reduce knife length.—*Cincinnati Butchers' Supply Co., 150 Blade St., Cincinnati, Ohio.* (188F)

Continuous Gas Analyzer indicates concentration of methyl bromide in pest-control applications. Instrument is easily operated and accurate to ±2½% of full scale. Shipping weight is about 40 lb.—*Gow-Mac Instrument Co., 100 Kings Rd., Madison, N. J.* (188G)

EQUIPMENT APPLICATIONS



Steel Conveyor Belt Offers Rapid Product Cooling

Commonly used in bakery ovens, this steel belt is now speeding the cooling of baked goods at Chattanooga Bakery, Inc., Chattanooga, Tenn. Furthermore, it has paid for itself in about 18 months by eliminating periodic replacement of belts formerly used.

A 1½ hp. motor drives the 80-ft.-long unit (Sandvik Steel, Inc., Belt Conveyors Div., 1702 Nevins Rd., Fair Lawn, N. J.). Made of cold-rolled hardened and tempered steel strip, it has a self-adjusting takeup, and scrapers for removing any adhering material.

Circle 189A on Reader Service Card

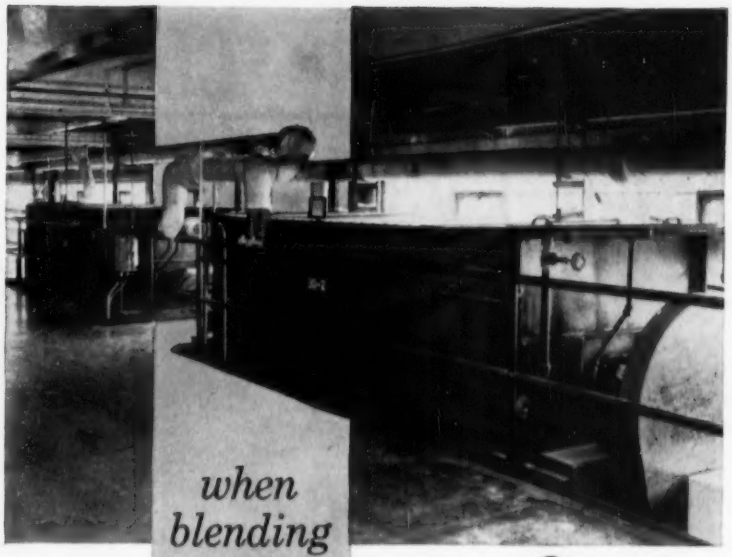
Cuts Refrigerating Costs With Centrifugal Coolers

Savings from the use of a split cooling system reportedly will repay the first cost of two 200-ton ammonia-condensing centrifugal cooling units employed at the Ville LaSalle Brewery of John Labatt Co., Ltd., Montreal.

Steam normally required for processing also powers one machine (Carrier Corp., Syracuse 1, N. Y.) at virtually no extra expense to satisfy average refrigerating needs. Other unit is electric-driven and used for maximum production, stand-by service, and over week ends when the plant's steam facilities are shut down.

Biggest cooling job is to reduce the temperature of wort from 200 to 50 F. in 1½ hr. Air conditioning of storage and process rooms is another vital application. Temperatures ranging from 32F. for storage cellars to 50F. for the ale fermenting room are controlled by 12 diffusers.

Circle 189B on Reader Service Card



when blending

FOOD PRODUCTS

at the

Nestlé Co., Inc.

DAY JUMBO MIXERS . . . meet every requirement for maintaining a thorough blend of chocolate products under sanitary conditions at The Nestlé Company, Inc., Fulton, N. Y. For instance: seals may be furnished of sanitary construction requiring no packing, and of such simple design as to permit thorough cleaning in a matter of minutes between batches—(no more black specks working into product from stuffing boxes).

Outboard bearings on all models allow plenty of room for normal cleaning and maintenance. Special agitators available for blending high shortening content products. Heating or cooling jackets, dust covers and many other optional features available. For complete information write for Bulletin 800.

in mixing equipment FOUNDED 1887 **DAY** *means longer life span*

THE J. H. DAY COMPANY

Division of Cleveland Automatic Machine Company

4924 BEECH ST. • CINCINNATI 12, OHIO

Quality equipment for baking, paint and varnish, printing ink, chemical, rubber, pharmaceutical, cosmetics, paper and pulp, explosives, food, ceramics, candy, soap, sugar and milk products.

Mexico: T. de la Pena e Hijos, S.A., Nazas 45-A, Mexico 5—D.F.

LOW HAULING COSTS COME RIGHT FROM THE "HEART" OF A '57 CHEVY

Many of the things that make a Chevrolet truck more economical to run are seldom seen by the owner. They're hidden features, deep in the truck's design. Here are just a few of them, to prove a Chevy's engineered better and built better for bigger savings!

1. *Forged steel crankshaft*—It's extra sturdy, precision machined and balanced, the foundation for dependable, long-lasting power!

2. *Aldipped exhaust valves**—Special aluminum treatment on valve surface protects valves against pitting; engine wears less, costs you less to run!

3. *Hydraulic valve lifters*—for longer valve life in V8's, fewer engine repair jobs.

4. *Chevy V8 piston*—Thanks to *short-stroke* V8 engine design, this piston travels a shorter distance, wears less. Short-stroke efficiency aids fuel economy, too!

5. *Oil-bath air cleaner—standard* on all Chevrolet truck engines for added protection against dust and foreign matter that shorten engine life.

6. *High-capacity oil filters***—They remove dirt particles from Chevy engine oil to cut engine wear and maintenance.

7. *Easy-adjust distributor points*—You can adjust this new Chevy V8 distributor *with the engine running*; it's added insurance against costly down time.

8. *Multiple fuel filters*—For *clean* fuel, all Chevy engines have fuel filters in the carburetor and fuel tank; in addition, V8's provide an *extra* filter at the carburetor.

9. *Ball-Gear steering mechanism*—Inside this steering gear scores of polished steel balls virtually eliminate friction. Less friction means less wear, less maintenance!

10. *Rugged manual transmission*—Synchro-Mesh design eliminates the need for double-clutching, reduces costly wear. Gears are shot-peened for extra strength.

11. *12-volt battery*—provides sure starting, good ignition, long battery life in all Chevrolet trucks.

And there are many more! See your Chevrolet dealer for all the dollar-saving facts. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

**On Thriftmaster 6, Trademaster V8.*
***Standard on V8's and Jobmaster, optional on Thriftmaster 6.*

1957 CHEVROLET TASK·FORCE TRUCKS

PROVED ON THE ALCAN HIGHWAY . . . CHAMPS OF EVERY WEIGHT CLASS! CHEVROLET

JUST OFF THE PRESS

NEW CATALOGS AND BULLETINS
—Free For The Asking—

PLANT ENGINEERING

Industrial Insulations

Presents complete information for glass fiber insulation including pipe, duct, equipment, and cold storage applications. Data, photos, and drawings aid selection and installation of proper insulation. Engineering data charts are also helpful. File 37-D, 120p.—*Owens-Corning Fiberglas Corp., Toledo, Ohio (191A)*

Glazed Wall Tile

Describes colored wall tile available in new larger sizes. Full color bulletin includes trim shape charts and construction details. Folder 900, 12p.—*American-Olean Tile Co., Lansdale, Pa. (191B)*

Valve Selection Guide

Contains tables, technical data, and information on the selection of valves, boiler mountings, and lubricating devices. Completely indexed for easy reference. Circular 555, 24p.—*Lunkenheimer Co., Cincinnati, Ohio (191C)*

Centrifugal Pumps

Covers custom-built, off-the-shelf, high-speed centrifugal pumps for handling clear liquids and fine slurries. Available in a variety of materials, hydraulic range includes capacities to 600 gpm., heads to 160 ft. Bulletins P-3B, C, 6p.—*Ampco Metal, Inc., Milwaukee (191D)*

Air-Cooled Condensers

Presents data on air-cooled condenser line for jobs of 240 tons and higher. Selection tables for 35F. walk-in coolers, 0F. and −20F. freezers are featured. Catalog R-400, 12p.—*Kramer Trenton Co., Trenton, N. J. (191E)*

Wide Variety of Motors

Covers prices and selection data on normal speed and geared motors, and variable speed transmissions and speed reducers. Easy-to-read tables simplify drive selection. 20p.—*Sterling Electric Motors, Inc., Los Angeles. (191F)*

Charcoal Filter

Details equipment and applications for charcoal air filtering, places where equipment should be used, and odors removed. Catalog 656, 56p.—*Barnebey-Cheney Co., Columbus, Ohio. (191G)*

Pole Buildings

Considers industrial applications of low-cost pole-type buildings. Many photos are included. *Form 122-87-856, 12p.—Dow Chemical Co., Midland, Mich. (191H)*

Polyvinyl Eductors

Recommends polyvinyl chloride eductors for pumping and mixing of liquids and small particle solids. Corrosion resistance is stressed. *Bulletin 2M-PVC, 2p.—Schutte & Koerting Co., Cornwells Heights, Pa. (191I)*

Water Chillers

Treats of an air-cooled water chiller line with capacities up to 38,500 Btu. Form 31, 8p.—*Vic Manufacturing Co., Minneapolis. (191J)*

Pipe Fittings

Catalogs straight thread pipes and adapters, O-rings for straight thread fittings, and steel and brass pipe fittings. Catalog 4360, 12p.—*Parker Appliance Co., Cleveland (191K)*

Welded Grating

Lists dimensions and specifications for line of welded gratings. All joints have a minimum ⅛ in. dia. weld connecting all three bars. 8p.—*Globe Co., Chicago (191L)*

Free Literature—Fast Way

Any of these very-latest catalogs, bulletins, or folders will be sped to you gratis. Just note here the specific literature you want, then circle each key number (there's one given at the bottom of each item) on the handy Reader Service postcard — back of book. Then sign at the bottom and mail.

For your convenience, too, all items in this department are listed and keyed in the Reader Service Section.

Fractional Hp. Motors

Gives ratings, dimensions, and discusses general engineering facts for a series of fractional horsepower, 48- and 56-frame motors. Units rated from 1/20 to 1 hp. *Bulletin 1-1PI, 12p.—Century Electric Co., St. Louis. (191M)*

PVC Ball Valves

Pictures new PVC ball valve

"Emulsifier" is not the most stimulating of words

The word "emulsifier" never made anybody hungry. It suggests chemistry and test tubes and great big process kettles, whereas people (even chemists) like to think of either a) Grandma by the pantry whipping up something 'specially delicious or b) *la haute cuisine*, an art form which cares not a fig about the depression of interfacial tension.

It so happens that in foods where fat and non-fat must stay united in appetite-rousing texture, the health of the sales curve usually demands a little something to reduce interfacial tension. We propose *Myverol® Distilled Monoglycerides*.

Monoglycerides have been components of human food since long before there were any chemists. In *distilled* monoglycerides there are big advantages. Because they are virtually straight monoglyceride, unaccompanied by other substances from the reaction mixture in which they are commercially produced, a very small quantity does the emulsifying job. This saves money. There is nothing to affect flavor. There is no residual catalyst to rob you of the very monoglyceride it helped produce.

If you suspect that a product of yours could use help for its stability of texture, we shall be very happy to look into it with you. We make a lot of different kinds of distilled monoglycerides for a lot of different food purposes. Write ***Distillation Products Industries,*** Rochester 3, N. Y. Sales offices: New York, Chicago, and Memphis • W. M. Gillies and Company, Los Angeles, Portland, and San Francisco • Charles Albert Smith Limited, Montreal and Toronto.

distillers of monoglycerides made from natural fats and oils

DPi

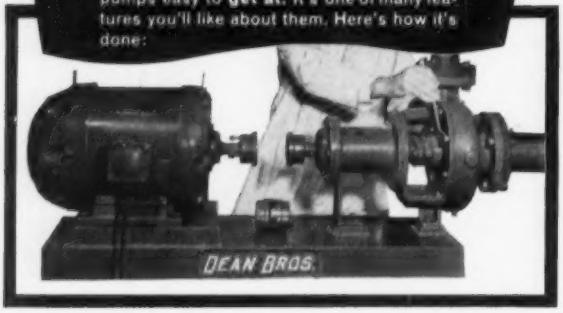
Also . . . vitamins A and E in bulk for foods and pharmaceuticals

Distillation Products Industries
is a division of **Eastman Kodak Company**

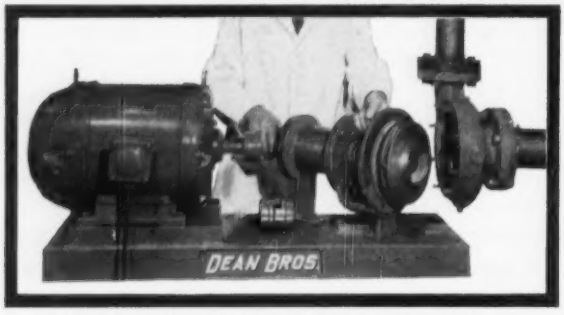
Easy to "get at"

WITHOUT DISCONNECTING THE PIPING

Every pump needs inspection from time to time—and occasionally some service. So Dean Brothers makes these Type "GS" pumps easy to **get at.** It's one of many features you'll like about them. Here's how it's done:



Disconnect the coupling. Unbolt the combination back head and cradle assembly from the casing.



Unbolt the feet from the base. The combination assembly is then ready to move to the bench for inspection or service. **Piping remains intact.**

TYPE "GS" STANDARD CENTRIFUGAL PUMPS for GENERAL SERVICE in the FOOD PROCESSING INDUSTRY

- 7 SIZES: up to 600 gal. per min.
- TOTAL DYNAMIC HEAD: up to 275 ft.
- TEMPERATURE OF LIQUID: from — 40°F to + 350°F.
- Available from stock in ALL IRON, BRONZE FITTED or STAINLESS STEEL Construction.

These pumps are particularly applicable to the efficient, low-cost pumping of such liquids as

- WATER
- ALKALI SOLUTIONS
- BRINE
- LIQUID FOODS AND INGREDIENTS
- OIL

Write for descriptive Circular No. 190 or for our recommendations for your specific application.

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EST. 1869
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for handling corrosive fluids. The full flow, quarter turn shut-off valves are available in sizes to 2 in. 2p.—*Jamesbury Corp., Worcester, Mass. (191N)*

Ventilating Systems

Lists ducting, fittings, hoods, and fans for thermoplastic corrosion-proof ventilating and exhaust systems. Typical systems are diagrammed and pictured. 12p.—*American Agile Corp., Bedford, Ohio (192A)*

Clutch Products

Full color manual has dimension drawings, application photos, and data for a variety of clutch products. Includes useful information on a variety of clutch installation problems. Manual 56, 78p.—*Marland One-Way Clutch Co., LaGrange, Ill. (192B)*

Low Temperature Facts

Recommends methods for installing insulation for refrigerated rooms. Suggested thicknesses are listed as well as adhesives, finishes, and other accessories. Booklet FL-101, 20p.—*Pittsburgh Corning Corp., Pittsburgh, Pa. (192C)*

Tinplate Handbook

Contains information on weight of tin coatings, and has other useful data on quality of tin plate. 43p.—*Tin Research Institute, Inc., Columbus, Ohio. (192D)*

Ice-Chip Units

Drawings show breakdown of each component and complete ice chip system. Chips of thumb nail size are produced on chrome surfaces of 1 to 50-ton units. 3p.—*Kent Industries, Chicago, Ill. (192E)*

Diaphragm Metering Pump

Includes technical description and applications of a diaphragm pump for controlled volume pumping of fluids. Can be had in capacities up to 339 gph. Bulletin 44, 24p.—*Lapp Insulator Co., LeRoy, N. Y. (192F)*

Canned Motor and Pump

Discusses canned motor-pump unit said to eliminate leakage, packing adjustment, lubrication, oil contamination, complicated fittings. Dimension drawings and performance curves of ¼ to 7½ hp. models are included. Bulletin 1001, 12p.—*Nuclear Pump, Inc., Philadelphia (192G)*

Pipe Hangers

Lists a variety of pipe hangers and supports. Each item is drawn and available sizes are catalogued. Also has useful data. 64p.—*Carpenter and Paterson, Inc., Cambridge, Mass. (192H)*

Shell-Ice Maker

Photographs show applications of shell-ice makers that consist of a series of stainless-steel tubes suspended vertically and cooled to a low temperature with direct-expansion refrigerant. Units producing up to 46 tons of ice per day are available. Bulletin 54-C, 8p.—*Frick Co., Waynesboro, Pa. (192I)*

Dairy Refrigeration Unit

Illustrates dairy processing equipment including condensers, room coolers, air conditioners, vapor condensers, as well as food freezing and frozen storage refrigeration. Bulletin 134, 8p.—*Niagara Blower Co., New York City. (192J)*

Zeolite Softener

Explains and describes equipment for zeolite water softening process. Automatic control operations are discussed. Publication 4520 C, 20p.—*Cochrane Corp., Philadelphia. (192K)*

MATERIALS HANDLING

Automatic Gross Weigher

Describes gross weigher that offers accurate, push-button weighing of difficult adhesive materials. Optional components, feed arrangements, and dimensional drawings are included. Bulletin 0356, 6p.—*Richardson Scale Co., Clifton, N. J. (192L)*

LP-Gas Fuel System

Specifications for LP-gas fuel systems for lift trucks said to increase engine life, lower maintenance cost, increase oil and filter life and decrease fuel consumption. Forms 1455A, 1473-6, 10p.—*Hyster Co., Portland, Ore. (192M)*

Cable Conveyor System

Describes simple conveyor for transporting light loads. Takes 15-lb. maximum loads hooked over conveyor at any point. 4p.—*M-H Standard Co., Jersey City, N. J. (192N)*

Lifts and Conveyors

Provides specifications on skid load-lifts, pallet load-lifts, and conveyors. Photographs, drawings, and tables of ratings are included. Catalog HM-56, 4p.—*American Pulley Co., Philadelphia. (192O)*

Control Applications

Reprint discusses new applications of devices for automatic control. Advantages and disadvantages of various types of process-stream analyzers are explained. *R-88, 5p.—Beckman Instruments, Inc. Fullerton, Calif. (193A)*

Level Controller

Describes level controller designed to indicate and control a predetermined level in liquids and bulky solids. An electronically-actuated relay operates built-in signal lamp and a snap switch. *Bulletin F-101-3.—Robertshaw-Fulton Controls Co., Philadelphia. (193B)*

Electronic Indexometer

Covers electronic indexometer that continuously measures index of refraction. The device can be used to monitor in-line-mixing, product lines, or batch mixing by means of a 1-in. square contact surface. *2p.—Industrial Gauges Corp., W. Englewood, N. J. (193C)*

Switches and Relays

Shows 40 different switches and relays, ranging from standard units to miniatures, and describes the operation and characteristics of each. Engineering specifications and new development switches are included. *10p.—Jaidinger Mfg. Co., Inc., Chicago. (193D)*

Thermocouple Components

Furnishes technical data on thermocouple plugs, jacks, and jack panels. Drawings accompany listing. Specification S005-1, *4p.—Minneapolis-Honeywell Regulator Co., Philadelphia.*

Electronic Weighers

Depicts tank, bin, and hopper electronic weighing systems for accurate mixing of powdered material. Drawings show installation and construction features. *Bulletin 4302, 8p.—Baldwin-Lima-Hamilton Corp., Waltham, Mass. (193F)*

Specific Gravity Unit

Details indicator for remote readings of specific gravity of liquids. Theory is discussed and installation diagrams are shown. *Bulletin 7004, 4p.—Petrometer Corp., Long Island City, N. Y. (193G)*

Dielectric Ovens

Describes principles, construction, uses, of electronic ovens. Five models have outputs from 15 to 150 kw. *Bulletin 56-E, 4p.—Young Bros. Co., Cleveland. (193H)*

PROCESSING

Hot Oil Systems

Furnishes description of electrically-heated fully-automatic systems that produce oil at temperatures up to 600 F. Bulletin 1255, *4p.—Parks-Cramer Co., Fitchburg, Mass. (193I)*

Plate Freezer

Announces double-contact plate freezer incorporating vacuum cold plates, supporting frame work, liquid and suction headers, flexible connections, hydraulic lifting mechanism in one assembly. Models having 9 to 24 stations can be had. Catalog FE, 8p.—*Dole Refrigerating Co., Chicago. (193J)*

Activated Charcoal

Discusses principles and applications of activated charcoal. Bulletin E-38, 5p.—*Barnebey-Cheney Co., Columbus, Ohio. (193K)*

Poultry Equipment

Describes many poultry processing items including scalders, conveyors, sinks and troughs, lung and kidney units, cooling vats, offal strainers, and gizzard peelers, 20p. —*Kent Industries, Inc., Chicago. (193L)*

Mill Line

Covers models ranging from lab size to 200 gph. of mills for mixing, blending, grinding, disintegrating, homogenizing, and emulsifying. 8p.—*Morehouse Industries, Los Angeles. (193M)*

Dissolver Units

Data sheets describe dissolver models having hydraulic lift, tip-up, or tank-mounted construction. 10p.—*Cowles Dissolver Co., Cayuga, N. Y. (193N)*

Roll Moulder

Pictures moulder-panner for hamburger and frankfurter rolls. Unit pans up to 260 pieces per min. and changeover is simple. 4p.—*Read Standard Div., York, Pa. (193O)*

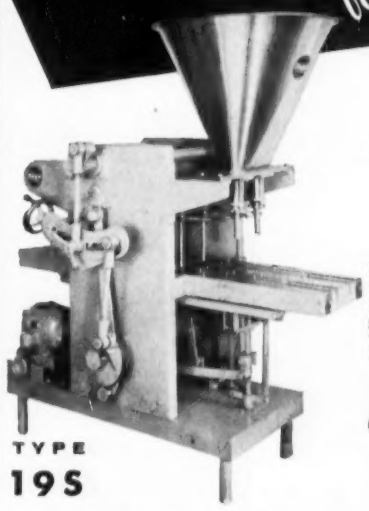
Canning Industry Films

Lists 47 canning films and tells how to get them. 24p.—*National Canners Association, Washington, D. C. (193P)*

Dairy Separators, Clarifiers

Full-color catalog describes dairy separators and clarifiers with photos and drawings of typical

TAILOR-MADE for filling



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set-ups. Discussions of principles and capacity tables also included. Catalog 2256, 16p.—*Centrico, Inc., Englewood, N. J. (193Q)*

Electric Sorting Machine

Describes operation and installation of electric machine that sorts automatically, by both relative brightness and hue. Feed mechanism passes objects, one at a time, to viewing area where they are judged by phototube. 16p.—*Electric Sorting Machine Co., Grand Rapids, Mich. (194A)*

Slaughtering Equipment

Catalogs complete equipment line for cattle, calf, and sheep slaughtering. Photographic details of each stage of the slaughtering operation and carcass charts are followed by the equipment section that includes knocking pens, hoists, conveyors, and inspection tables. Catalog 62-A, 64p.—*The Allbright-Nell Co., Chicago. (194B)*

Homogenizer Facts

Provides answers to 28 common questions on homogenizer operations and maintenance. Considers timing pumps, gaskets, oil, capacity, vibration, pump valves and seats, correct operating pressure, and various operating procedures. 20p.—*Manton-Gaulin Mfg. Co., Inc., Everett, Mass. (194C)*

Meat Industry Tools

Contains specifications, shipping weights, and prices for more than 2,200 meat industry items. Many new products are included in the 650 illustrations and handy, 3-page cross-reference index. Catalog 88, 100p.—*Koch Supplies, Kansas City, Mo. (194D)*

Tubular Filters

Stresses tubular filter elements and shows pictures and drawings of their applications. Research results and flow characteristics of metallic filter cloth are given. *Multi-Matter No. 3*, 4p.—*Multi-Metals Wire Cloth Co., Inc., New York City. (194E)*

Centrifugal Reel

Describes centrifugal reel made up of an inner cylinder, with beater bars, rotating at a speed of 135 rpm., and an outer cylinder 10 ft. long rotating at 30 rpm. Photos and drawings included. *Bulletin 76-A*, 2p.—*Sprout, Waldron & Co., Muncy, Pa. (194F)*

Mixer-Unloader Unit

Gives pertinent information on size, construction and design of a mixer-unloader unit. Equipment mixes dry material with water and discharges it into waiting trucks or rail cars at up to 100 tons per hour. *Data Sheet UC*, 6p.—*Allen-Sherman-Hoff Co., Wyncwood, Pa. (194G)*

MAINTENANCE

Fundamentals of Wear

Discusses wear and lubricant performance. Lubrication No. 12, 16p.—*The Texas Co., New York City. (194H)*

Industrial Gaskets

Pictures styles, lists materials, and tables dimensions for a line of industrial gaskets. Many applications are treated. *Form 561*, 28p.—*Chicago-Wilcox Mfg. Co., Chicago. (194N)*

Rust Preventive Coatings

Photos give ideas for protecting girders, tanks, piping, and equipment from rust with protective coatings. Form 256, 32p.—*Rust-O-Leum Corp., Evanston, Ill. (194J)*

Air Nozzle

Describes air nozzle with only two working parts. Thumb pressure regulates the aluminum alloy units. 1p.—*Mortimore Mfg. Co., Stratford, Conn. (194P)*

Concrete Floor Protection

Concerns use of a sealer for protecting concrete floors from oils and fats. Coating also stated to seal out dust. 4p.—*Truscon Laboratories, Detroit. (194L)*

Sheave Unit

Introduces 1- and 2-groove sheaves for speed adjustment of V-belt drives. Designed for low horsepower application, new key design prevents setscrews from biting into threads. *Bulletin 20B8524*, 4p. — *Allis-Chalmers Mfg. Co., Milwaukee. (194M)*

Insulating Tape

Reports properties and uses of irradiated polyethylene electrical insulating tape. 12p.—*General Electric Co., Pittsfield, Mass. (194I)*

Tube-Working Tools

Catalogs hand tube-cutters, flarers, and benders, as well as bench-mounted benders, a power flare, straight thread tapper, and counter-boring tube-working tools. Includes section on how to use tools. *Catalog 1140*, 24p.—*Parker Appliances Co., Cleveland. (194O)*

Condensation Drip-Stop

Covers applications of a condensation drip preventive in a large number of situations. 32p.—*J. W. Mortell Co., Kankakee, Ill. (194K)*

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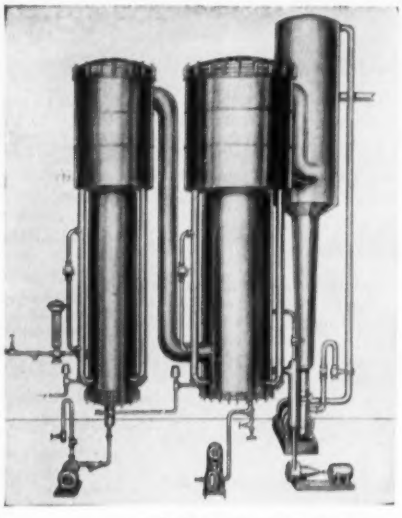

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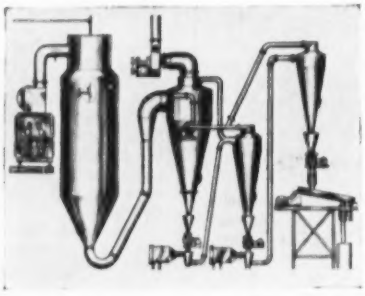

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This California packer of raisins, figs and apricots was replacing steam hose on an average of every six months. Then they tried Thermoid Powerflex Wire Braid Steam Hose.

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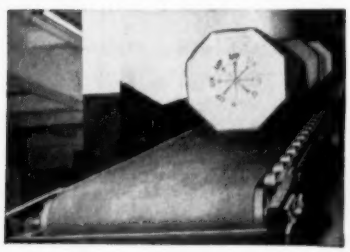

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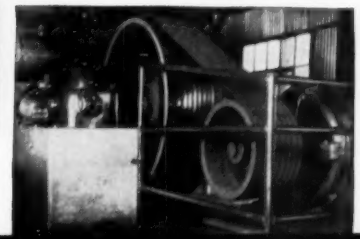

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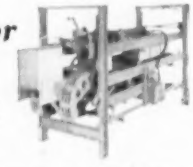

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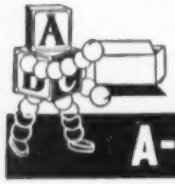

Whatever your packaging job, A-B-C has a production-proved machine for you—Case Sealers, Unloaders and Unscramblers, Side Sealers, Hand Gluers and Carton Fillers.

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tion requirements are discussed. Tables, drawings, photos and text give complete story. *Lubrication, No. 11—The Texas Co., New York City. (194Q)*

Steel Belt Conveyor

Reprint considers maintenance of steel belt conveyors. Scraper and cleaner maintenance, as well as idler, motor, and power transmission, lubrication, belt stretch, and guide maintenance are covered. *4p.—Sandvik Steel Inc., Fair Lawn, N. J. (196A)*

One-Shot Lubrication

Explains operations and service of push-type, semi-automatic lubricators. One- and two-tank units for servicing as many as 100 lubrication points are described, and there are paragraphs on starting a new machine. *2p.—Bijur Lubricating Corp., Rochelle Park, N. J. (196B)*

Power Lubrication

Considers push-button bench-line power lubrication by means of air-operated, vacuum-operated, and manually-operated units. Examples are noted and all fittings are described. *Form 1-3956, 8p.—Lincoln Engineering Co., St. Louis. (196C)*

MANAGEMENT

Safety Literature

Catalogs safety literature available in quantity. These include instruction cards, detail sheets, pamphlets, booklets, banners, films, streamers, and stickers. *16p.—National Safety Council, Chicago. (196D)*

Digital Computer

Treats of digital computers in a manner understandable to technical or non-technical people. Covers use in automatic manufacturing, processing, data and materials handling, and in clerical business operations. *15p.—Computer Controls Co., Inc., Wellesley, Mass. (196E)*

Business Telephones

Reports on how three firms use business telephones to advantage. Management uses in executive control, inventory control, production, and personnel are included. *Reports 107, 109, 112. 20p.—Automatic Electric Sales Corp., Chicago. (196F)*

Meat Research

Outlines research results for fiscal year 1954-55 in meat curing and tenderization, nutrition, equipment design, radiation and high-frequency processing, animal fats and anti-oxidants, analytical methods, and food spoilage. *Bulletin 29, 60p.—American Meat Institute Foundation, Chicago. (196G)*

Omaha Plant Sites

Chamber of commerce bulletins stress water resources, economic development, markets, labor supply, transportation, and other pertinent factors of interest to processors planning location in the Omaha, Neb. area. *34p.—Omaha Chamber of Commerce, Omaha, Neb. (196H)*

Vending Displays

Shows 20 modern vending displays and describes how each attains its specific objectives. *Booklet No. 10, 34p.—Hinde & Dauch, Sandusky, Ohio. (196I)*

Records Control

Four-color bulletin outlines methods of improving management and records control. Describes proper applications of records-producing equipment. *Booklet BSD 45, 8p.—Sperry Rand Corp., New York City. (196J)*

PACKAGING

Packaging Production Line

Describes line which forms pouch-package, fills, seals, conveys to cartoner, cartons accurately and automatically. Accommodates a variety of carton styles, sizes. *4p.—Bartelt Engineering Co., Rockford, Ill. (196K)*

Cottage Cheese Filler

Pictures operation of an automatic cottage cheese filler. Other products can be handled in the unit that dispenses, fills, caps, and codes almost all styles of containers. Form 253, *4p.—Triangle Package Machinery Co., Chicago. (196L)*

Foil Packaging Ideas

Three colored folders show new developments in foil packages for frozen meats, refrigerated meats, and frozen specialties. Included are frozen hamburger patties, roasts, dinners and others. Forms 201, 2, 3, *12p.—Ekco-Alcoa Containers, Inc., Wheeling, Ill. (196M)*

Vacuum-Trimming Machine

Describes 3-in-1 operation—vacuum forming, drape and plug forming, and automatic trimming of thermoplastic sheets—of vacuum trimming machine. *4p.—Vacuum Forming Corp., Port Washington, N. Y. (196N)*

INSTRUMENTS

Instrument Fundamentals

Discusses fundamentals of instrumentation. Contents include measurement of process variables, remote transmission of measurements, types of automatic controllers, power units and final control elements, control systems, and panelboards, 96p. — *Minneapolis-Honeywell Regulator Co., Philadelphia.*

Rotary Pressure Joints

Describes operation of self-supporting rotary joints used to admit steam or liquids into processing machinery. Joints are packless and need no lubrication or adjustment. Bulletins S-3001, J-2001, and N-2001, 34p.—*Johnson Corp., Three Rivers, Mich. (197B)*

Viscometer Recorders

Pictures recorder that contains synchronous motors, switches, and necessary electrical and mechanical components to record viscosity. Bulletin V-1217, 2p.—*Norcross Corp., Newton, Mass. (197C)*

Instrument Systems

Catalogs control and instrument systems for temperature, pressure, humidity, flame, and air flow. Shows motors, relays, panels, and cubicles. Bulletin 6fMI, 12p.—*Minneapolis-Honeywell Regulator Co., Philadelphia.*

Electrical Remote Control

Covers pushbutton and automatic electric remote positioning controls. Also shows shaft-mounted control gear motor that remotely controls flow, speed, proportion, and tension. Bulletin J-100, 8p.—*The Jordan Co., Inc., Milwaukee. (197E)*

Control Pilots, Transmitters

Concerns high-low safety shut-off pilot, pneumatic transmitter, and level and temperature control pilots. Catalog 72-14, 4p.—*Black, Sivalls & Bryson, Inc., Tulsa, Oklahoma. (197F)*

Process Instrumentation

Includes prices, covers application details of indicating, recording, controlling, and transmitting instruments for flow, pressure, and density. Catalog 2, 32p.—*Fischer & Porter Co., Hatboro, Pa. (197G)*

Periscope Viewers

Illustrates industrial periscopes for viewing hazardous processes, inaccessible places. 4p.—*Lenox Instrument Co., Philadelphia. (197H)*

"Our Clark Prest-O-Matic Door helped us in Expediting Traffic" says Belford Seabrook, Operating Vice President of Seabrook Farms

The big advantage, cited by Belford Seabrook is that the Clark Door eliminates costly open-door-time, helps maintain critical temperatures and speeds traffic.

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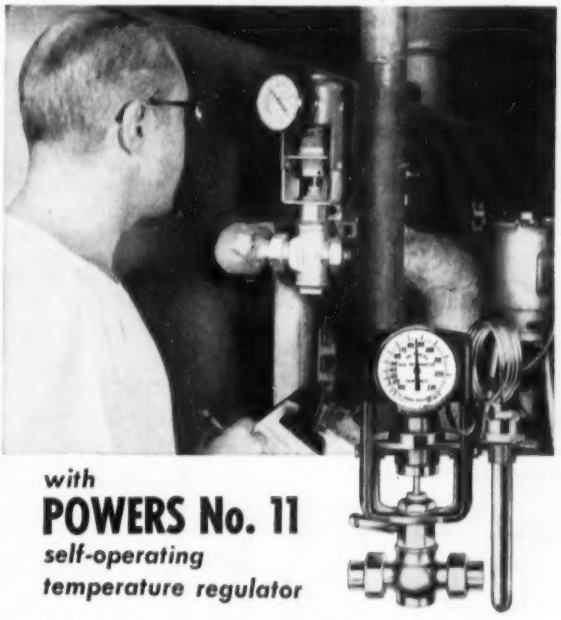

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MORE INFORMATION IN FREE FOLDER 36-2

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PATENT NOTES FOR ENGINEERS *By C. D. Tuska. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York City 36. 1956. 192 pages. 6 x 9¼ in., cloth. Price:* $4.

Directed at bridging the gap between engineer and patent attorney, this revised manual is written by the Director of Patent Operations at RCA's Princeton laboratories. It provides the technical man with a simple and authoratative guide to the patenting process.

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Two 1957 Editions

AIR CONDITIONING—REFRIGERATING DATA BOOK *Published by American Society of Refrigerating Engineers, 234 Fifth Ave., New York City 1. 1100 pages. 6¼ x 9 in., cloth. Price:* $10. This sixth edition presents the work of 90 experts in the field. Illustrations and tables supplement technical reports. A guide to manufacturers is also included.

1957 MODERN PACKAGING ENCYCLOPAEDIA *Published by Breskin Publications, Inc., 575 Madison Ave., New York City 22. 833 pages. 8½ x 11½ in., cloth.* Distributed by subscription. This 28th annual edition supplies a wealth of technical data used in planning and producing effective packages.

Explains Electrical Theory

LAPLACE TRANSFORMS FOR ELECTRICAL ENGINEERS *By B. J. Starkey. Published by Philosophical Library, 15 E. 40th St., New York City 36. 1955. 279 pages. 5½ x 8¼ in., cloth. Price:* $10.00.

Offering an aid to quick solutions for many engineering and physical problems, the Laplace transformation theory has only recently been fully appreciated by engineers.

This book offers a guide to the system in terms directed specifically at the engineer, and not the mathematician. It is presented as a general introduction and over-all view of the subject, and not as a complete reference.

Book is illustrated and indexed.

Encyclopaedia of Spices

A TREASURY OF SPICES *Published by American Spice Trade Assn., 82 Wall St., New York City 5. 1956. 225 pages. 6¼ x 9¼ in., cloth. Price:* $4.50.

Beginning with the history of the spice trade, this illustrated book provides a wealth of data on spices—from per capita consumption of cayenne pepper in the U. S. to legal holidays in Zanzibar.

Statistics cover imports, import duties, harvesting seasons, shipping time and price highs and lows. Spice standard and definitions are also included.

Booklets & Reports

APPRAISING AND INTEGRATING EMPLOYEE BENEFITS *Published by California Institute of Technology, Pasadena, Calif. 24 pages, paper. Price:* $1. Report based on proceedings of 1956 Southwest Area Conference on Industrial Relations.

USDA POULTRY INSPECTION—A CONSUMER'S SAFEGUARD *Published by USDA, Washington 25, D. C. 6 pages, paper. No charge for single copies* ($2.50 per 100 copies). Illustrated data on voluntary inspection service.

IMPROVING THE CALIBER OF COMPANY MANAGEMENT. *(No. 83 in General Management Series). Published by American Management Assn., New York City. 70 pages, paper. Price:* $1.75 ($1 *to members*). Six reports on boosting executive standards.

PRINCIPLES OF LABORATORY TEMPERATURE CONTROL, ELECTRONIC RELAYS, THERMISTER OPERATED TEMPERATUURE CONTROL *(PB 121120) Published by Office of Technical Service, U. S. Dept. of Commerce, Washington 25, D. C. 55 pages, paper.* $1.50. *Three-part report of research done for Navy.*

CHANGING PATTERNS AND CONCEPTS IN MANAGEMENT *(No. 182 in General Management Series). Published by American Management Assn. New York City. 55 pages, paper. Price:* $1.75 ($1 *to members*). Organization in management.

FLUID AGITATION HANDBOOK *Published by Chemineer, Inc., Dayton, Ohio, 46 pages, paper. Price:* $1.50. Theoretical and practical approaches to fluid mixing problems in process industries.

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RECENT INVENTIONS

PRODUCTS

Table Salt Including Vitamins by Dissolving Salt to Form Saturated Solution, Adding Vitamins, Spraying Under Pressure, Drying, Grinding—R. J. Bash to C. Ross, Los Angeles. No. 2,764,485. Sept. 25, 1956.

Freeze-Drying by Bringing Solution in Contact with Heat-Exchange Surface, Agitating, Scraping Surface, Separating Crystals—E. P. Wenzelberger to Commonwealth Engineering Co. of Ohio, Dayton, Ohio. No. 2,764,880. Oct. 2, 1956.

Whipping-Product by Treating Liquid Whey with Soluble Iron Salt, Removing Precipitate—M. E. Rodgers and R. G. Henika, Appleton, and R. E. Miersch, Kimberly, Wis. to Western Condensing Co., San Francisco. No. 2,765,232. Oct. 2, 1956.

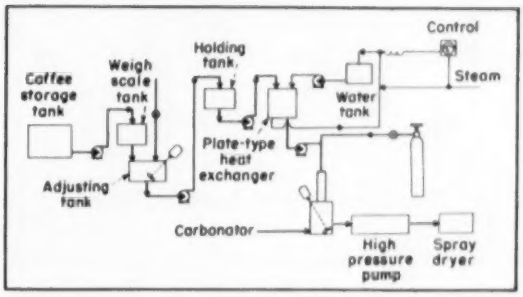
Citrus-Meal Carrier for Hygroscopic Vitamins by Treating Meal With Vitamins of Choline and Pantothenic Acid Group, Drying—J. E. Plitt, Pearl River N. Y. to American Cyanamid Co., New York City. No. 2,765, 231. Oct. 2, 1956.

Moist Food Wrapped With Moisture-Proof, Gas-Permeable Fabric Sheet, Coated with Glucose Oxidase, and Containing Glucose and Catalase Between Sheet and Product—B. L. Sarrett and D. Scott, Chicago. No. 2,765,233. Oct. 2, 1956.

Frozen Confection Comprising Pipette, Cylinderical Plug, Cup Surrounding Pipette—E. G. Moubayed, Washington, D. C. No. 2,766,123. Oct. 9, 1956.

Antibiotic Consisting of Ice of Solution Containing Antibiotic of Tetracycline Series, Polyvalent Cations, Polymer—S. D. Upham, Pearl River, Francis M. Callahan, Stony Point, and J. F. Weidenheimer, Pearl River New York to American Cyanamid Co., New York City. No. 2, 766,124. Oct. 9, 1956.

Sausage-Product Comprising Flat-Sided Cards, Tubular Membranes Containing Sausage Filling in Spiral Coil—C. H. Peschke, Detroit. No. 2,766,-125. Oct. 9, 1956.



Producing Carbonated Coffee Extract

Improving soluble coffee extract by absorbing carbon dioxide in coffee extract before drying. Extract is contacted with carbon dioxide at elevated temperature. Carbonated liquid is then fed to spray drier.—*F. A. Chase, Morris Plains, and G. E. Laursen, W. Orange, N. J. to American Home Products Corp., New York City.* No. 2,771,364. November 20, 1956.

Want more information on any of these recent patents—if so, you may obtain detailed printed copies by writing direct to the U. S. Patent Office, Washington, D. C., giving serial numbers of those you want and enclosing 25¢ for each copy.

PROCESSES

Purifying Sugar Liquors by Passing Through Bed of Activated Carbon at 125 F.—J. W. Vabor to Pittsburgh Coke & Chemical Co., Pittsburgh. No. 2,763,580. Sept. 18, 1956.

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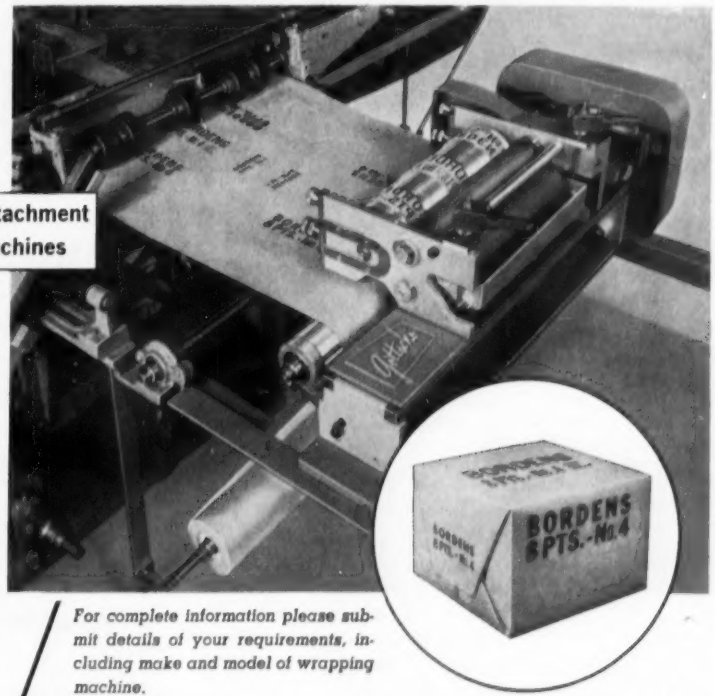

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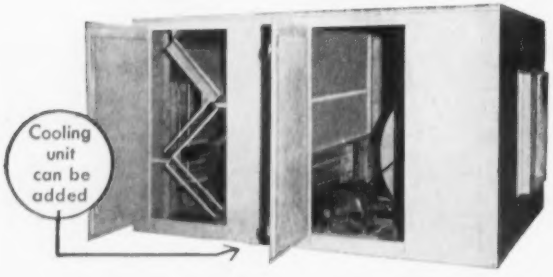

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Hexametaphosphate and Locust Bean Gum—J. W. Stevens, Upland and D. E. Pritchett Ontario, Calif. to Sunkist Growers, Inc., Los Angeles. No. 2,764,486. Sept. 25, 1956.

Preserving Shrimp by Blanching, Cleaning, Freezing, Placing Under Vacuum at —10 to —30 C, Heating—J. E. Blaine, Jr., Los Angeles to H. P. Wager, Montclair, N. J. No. 2,765,236. Oct. 2, 1956.

Puffing Cereal Grain by Feeding Into Hot Gas, Agitating, Introducing Into Puffing Gun—R. R. Reinhart to Quaker Oats Co., Chicago. No. 2,766,120. Oct. 9, 1956.

Bleaching and Deodorizing Meat by Contacting With Persulfate, Chlorite, Bisulfite Solutions—M. Mouton, Saint-Die, France to Olin Mathieson Chemicals Corp. No. 2,766,121. Oct. 9, 1956.

Preparing Food by Separating Flavor From Uneviscerated Turkeys, Removing Skins and Tendons, Eviscerating, Separating and Assembling Meat, Adding Flavor, Wrapping in Skin, Processing—F. George, Berkeley, Calif. to Norbest Turkey Growers Assn., Salt Lake City. No. 2,766,122. Oct. 9, 1956.

Treating Egg Material by Partially Coagulating Protein With Heat—L. R. R. Hawk, San Lorenzo, Calif. to Gerber Products Co., Fremont, Mich. No. 2,766,126. Oct. 9, 1956.

Preserving and Storing Fish by Immersing in Seawater at Near Freezing Point, Removing, Placing in Space Cooled by Seawater Ice—F. Amrod, Neuilly-sur-Seine, France, No. 2,766,598. Oct. 16, 1956.

Deep-Fat Cooking by Heating in Open Atmosphere, Removing Dissolved Air From Liquid —H. L. Smith, Jr., Richmond, Va. to H. W. Lay & Co., Inc. Atlanta, Ga. No. 2,767,095. Oct. 16, 1956.

EQUIPMENT

Asparagus Trimmer Comprising Conveyor, Backstop, Saw, Water-Jet Nozzles, Trimming Cutter—G. F. Scheckler, San Joaquin, Calif. No. 2,773,305. Sept. 18, 1956.

Citrus Juice Concentrator Having Evaporator, Liquid Receiver, Discharge Means—B. C. Skinner, Dunedin, Fla. to Minute Maid Corp., New York City. No. 2,774,233. Sept. 25, 1956.

Nut-Husker Including Conveyor, Nut-Engaging Devices, Cutter Disks, Drive Means—A. M. Porem, to T. Santos Gil & Cia Limitada, Lorenco Marques, East Africa. No. 2,764,198. Sept. 25, 1956.

Continuous Vegetable Extractor Employing Housing, Trough, Liquid Introducing Means, Material Carrying Means—K. Glinka to Buttner-Werke, A. G., Krefeld-Uerdingen, Germany. No. 2,764,474. Sept. 25, 1956.

Fowl Suspending Shackle Comprising Frame, Leg-Holding Supports, Head-Holder—H. J. Long to Swift & Co., Chicago, Ill. No. 2,764,778. Oct. 2, 1956.

Dough-Lump Spacer Consisting of Conveyor, Receiving, Retarding, and Separating Rollers—A. A. Liebelt, Cincinati, Ohio. No. 2,765,065. Oct. 2, 1956.

Orange-Blender Having Enclosure, Conveyor, Discharge Aperture—B. M. Middlebrooks, Leesburg, Fla. to Minute Maid Corp., New York City. No. 2,765,066. Oct. 2, 1956.

Carrier for Bakery Products Having Collapsible Structure With Open Front—W. C. Vaughn, Berwick, Pa. No. 2,765,111. Oct. 2, 1956.

Pineapple Sizing Unit Comprising Tube, Circular Cutting Edge, Fruit Conveyor, Compressed Air Means—W. de Back, St. Nicholas-Waes, Belgium and S. A. Mencacci, San Jose, Calif. to Food Machinery & Chemical Corp., San Jose, Calif. No. 2,765,829. Oct. 9, 1956.

Device for Measuring Hydrogenation by Permittivity Using Capacitance Cells—K. Goldsmith, Claughton, V. D. Worstall, Bedington, Wilral, and P. W. Hesergrave, Hove, England to Lever Bros. Co., New York City. No. 2,766,265. Oct. 9, 1956.

Tubular-Product Machine Comprising Means for Applying Sealing Liquid, Mandrel, Sleeve-Like Forming Member, Pressure and Cooling Means—

C. W. Tasker, Nether Providence Township, Pa. to American Viscose Corp., Philadelphia. No. 2,766,568. Oct. 16, 1956.

PACKAGING

Gluing-Unit for Rectangular Packages Comprising Conveyor, Glue Pans, Gluing Rollers—E. J. Derderian, Fresno, Calif. No. 2,764,123. Sept 25, 1956.

Enclosing Article in Thermoplastic Wrappings, Folding Flap, Heat-Sealing—I. Stanton, Bloomfield, N. J. to Celanese Corp. of America, New York City. No. 2,764,283. Sept. 25, 1956.

Flexible-Paperboard Carrier for Cans Comprising Top Panels, Continous Side Walls, Cross Strap Members—E. L. Arneson, Morris, Ill. to Morris Paper Mill. Chicago. No. 2,764,284. Sept. 25, 1956.

Can-Opener Key Comprising Conventional Key, Guide Having Flat Base, Tabs—L. M. Ceddomaid, Wareham, Mass. No. 2,764,312. Sept. 25, 1956.

Egg-Container Consisting of Molded Pulp Filler, Paperboard Carton—W. J. Schweitfeger, W. Englewood, N. J. No. 2,764,334. Sept. 25, 1956.

Label-Withdrawing Means Including Label Receiving Surface Adapted to be Adhesively Coated, Magazine, Air-Jet Means—W. Weiler to Jagenberg-Werke Akt.-Ges. Dusseldorf, Germany. No. 2,764,408. Sept. 25, 1956.

Carton Comprising Box Having Slit to Form Openings Receiving Ends of Cans—A. J. Murray, Minneapolis. No. 2,765,073. Oct. 2, 1956.

Filler Having Measuring Chamber With Movable Wall, Actuator Means—R. F. Anderson, Rockford, Ill. No. 2,765,601. Oct. 9, 1956.

Carton-Filler With Continuous Conveyor, Carton Mover, Can-Inserting Means—A. F. Rose, San Jose, Calif. No. 2,765,603. Oct. 9, 1956.

Bag-Unit Having Hopper, Feed Screws, Measuring Device, Means to Position Two Strips of Heat-Sealable Enclosing Media—O. R. Brelsford, G. L. Stone, and J. E. Aldridge to Cup Brew Coffee Bag Co., Denver. No. 2,765,605. Oct. 9, 1956.

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Spraco has the most complete line of nozzles available anywhere — **IN STOCK.** Capacities range from ⅛ pint/min. to 4000 gal./min. Bronze, cast iron, and stainless steel. Write for our nozzle catalog.

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These GMC Pumps are ideal for a multitude of jobs. Smooth and efficient whether vertical, horizontal, up-side-down or any inclination. Low first cost, low power and maintenance costs. Top quality "by Aurora."
Caps. 10 to 800 G.P.M.
Heads to 250 Ft.
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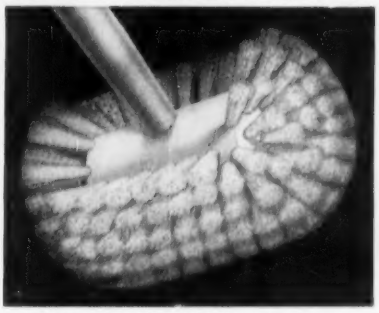
NYLON BRISTLES NEVER GET SOGGY!



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Penick & Ford Ltd., Inc., New Orleans, La., world-famous for their Brer Rabbit molasses and syrup and one of the largest producers of these products, recognizes the important role of the shipping container in maintaining the purity of their products. That's why they use Inland "protection-eered" drums and pails, with sanitary linings specially formulated to protect their products against contamination from the time they leave the shipping dock until they reach the customer's plant.

Is your present package delivering the quality you ship? Find out how Inland Steel containers, tailor-made for your product, put quality control into your package. Write today to Mr. Robert Boecher, Room 336G.

**the right container, with the right lining for your product*

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Plants: Chicago • Jersey City • New Orleans • Cleveland & Greenville, Ohio

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Positions Wanted
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Civil Service Opportunities
Selling Opportunities Wanted
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Employment Agencies
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March Issue closes February 25th.

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SUPERIOR SEPARATOR COMPANY
Hopkins, Minn.

All replies will be treated confidentially.

Draftsmen

Familiar with equipment and plant layout for food processing. Salary commensurate with experience. Write full details.

P-4023, Food Engineering,
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When there are many applicants for a single position it frequently happens that the only letters acknowledged are those of the most promising candidates. Others may not receive any indication that their letters have even been received by a prospective employer much less given consideration. These men often become discouraged, will not respond to future advertisements, and sometimes question their bona fide character.

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Classified Advertising Division

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Salaried Personnel, $5,000-$30,000. This confidential service established 1927 is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. F., P. O. Box 674, Manchester, Vermont.

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Food Technologist—Age 33, 8 years experience in Quality Control and Production of Frozen Fruit and Vegetable products. Has done product development and plant layout. Desires position with a future. PW-4200, Food Engineering.

Plant or Prod. Mgr. with 20 years high quality low cost experience, purchasing, production, costs, quality control, selling, Jams, Jellies, Dressings, Sauces, Syrups, Fruits, Vegetables, Meats, Soups, Poultry other specialties. Prefer Northern Calif. PW-4105, Food Engineering.

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Research and development coordinator in QMF&CI. Expect masters degree in business from Stanford University in June. Available for interviews immediately at San Francisco or vicinity. Location open. 25 years old, married, one child. Please write:

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Age: 40-45

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Food Technologist-Chemist

Sales Position—working with the food industries on new products and product improvements.

Excellent opportunity for an experienced food technologist, food or cereal chemist.

All replies confidential.

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P-3850, Food Engineering,
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P-4022, Food Engineering,
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FOOD TECHNOLOGIST
College Graduate; B.S. Degree

To be located in our research laboratories in Glenview, Ill.
2 to 5 years industrial experience *jams, jellies, and preserves,* both in research and manufacture.

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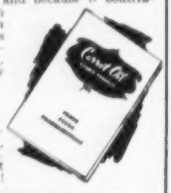

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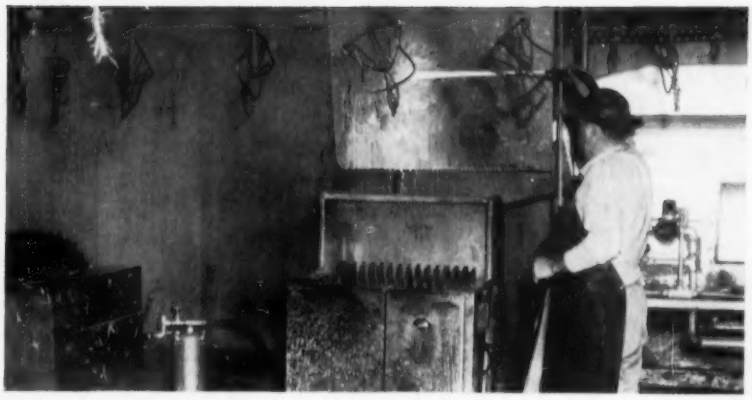

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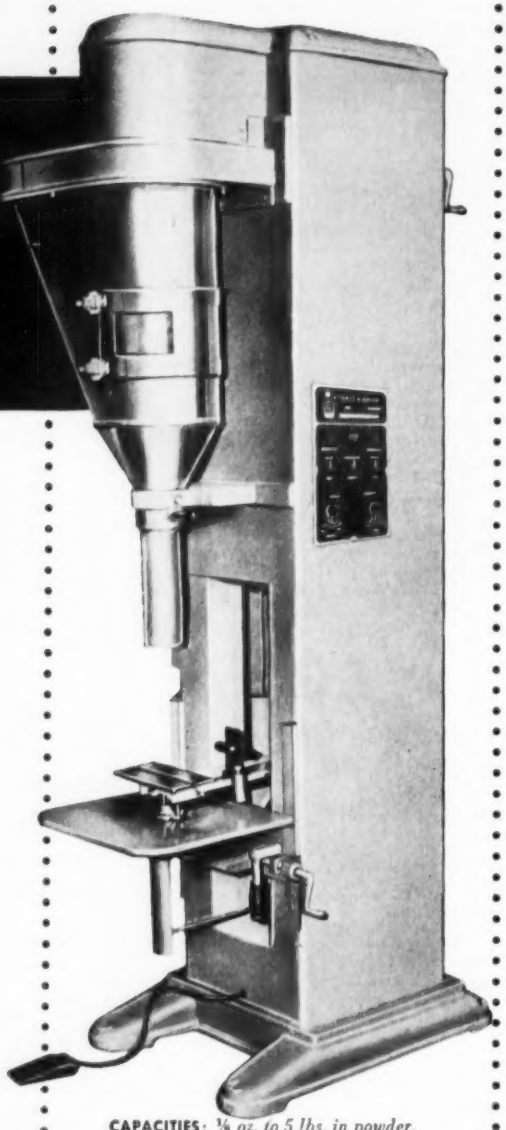

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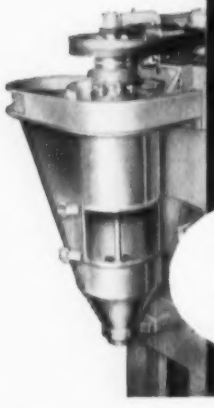

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These numbers correspond to numbers in text.

20A	178A	183C	188D	191H	192G	193F	194B	194N	196I
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20C	178C	188B	188F	191J	192I	193H	194D	194P	196K
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22C	179A	188E	189B	191M	192L	193K	194G	196B	196N
22D	179B	188F	191A	191N	192M	193L	194H	196C	197B
22E	179C	188A	191B	192A	192N	193M	194I	196D	197C
25A	181A	188B	191C	192B	192O	193N	194J	196E	197E
26A	181B	188C	191D	192C	193A	193O	194K	196F	197F
29A	181C	188A	191E	192D	193B	193P	194L	196G	197G
177A	183A	188B	191F	192E	193C	193Q	194M	196H	197H
177B	183B	188C	191G	192F	193D	194A			

☐ 1 yr. $2 ☐ 2 yrs. $3 ☐ 3 yrs. $4

Domestic rates only for others, see p. 5

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Company .....

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* * *

Whether you select the fibreboard container or the metal can whose popularity with frozen food packers is growing so rapidly—*remember*, your Canco salesman is a packaging specialist ready and anxious to serve *you!*

CANCO "Can do!"... *that's the spirit of* American Can Company

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